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HSKCP67	1217	895644	1 - 1963	15 - 1977	BF684543, BF685031, AI740547, AW572309, AL535090, AW978678, AI761204, AA741319, AI001802, AW467009, AI986107, AI261766, AA421542, AA746023, R67552, AI823500, AA421398, BF511294, AI573196, AI376921, AA975777, BF446281, AA814148, AA024836, AA946575, AI149941, H23637, AA024792, AI277187, AA634859, R67551, AI214374, R01773, H22357, AI934527, BE170483, AI394623, AA069448, AA455743, AA991800, R01772, AW843923, AI090982, BF063997, AA069485, AI432666, AI493559, AW772685, BF849158, AL047675, BF795712, AL040207, AI432644, AI623302, AI866786, AI284509, AI434242, AI537943, BE885490, AI539771, AI537677, AI436429, AI433976, BG257535, AI805769, BG110517, BE897632, BG029667, AL042551, AI889147, BF904189, AI610557, AI242736, BG252929, AI916691, AL514935, AI494201, AW151136, AI866573, AI500523, AW858243, BG260144, AI889168, BF038804, AW172723, BF726868, AI554821, AI815232, BF811780, AW151138, AI433157, AI801325, AL045891, AI537515, AI521560, AI500659, BF968910, BF338002, AI582932, AI923989, AI284517, AI872423, AI371228, AI500706, AI491776, AI445237, AL046356, AI889189, AI500662, AI440263, AI633493, AI434256, BE886728, AI888661, AI284513, AI888118, AI859991, AI440252, AI890907, AI860003, BG249582, AI887499, AL042787, BF726234, AI274759, BE963035, AI432653, BF725868, AW081103, BF814335, BF726237, BG029053, BG168185, AL047422, AL045500, BF812438, BF032404, AI866465, BF814541, BF970652, AI364788, AV745008, AI371251, AI366900, AI866510, BE047952, AI923046, AI620284, BG120816, BE047737, BF904193, AW301344, BF814409, AI648567, BG179099, BF971016, BE895585, AI866608, BE018334, BF726183, BE968711, BF970449, BG107576, AV739574, AW663332, BE875407, BF726322, BE048071, AW858254, AW083804, BF814420, BF726504, AI499463, BG026428, AW191003, BF339322, BF727212, BF793324, AI269862, BF344652, BF816037, AL119791, BF904180, AA420758, BE785868, AI336575, BF792469, BE786043, AL041862, BG256592, BF814504, BF812961, AL531653, AW827289, BF032768, AL513985, AI345111, BF968504, AI344785, BG112879, BF036448, BG109270, AW162189, AI049851, AI351528, AL048323, AI628850, BG112718, AW827276, AW827206, BF038131, BF339594, AW118237, BF527014, BF812960, BF812938, BF822127, AW673679, AL046926, BE894455, BE047852, BF338723, BE876033, AL048375, BF727352, BG113712, BF526262, BF680133, BE880182, AI344817, BE536058, AX030435,

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HBGOJ26	1218	895700	1 - 724	15 - 738	AI679032, AI269591, AI926385, AA427824, BF568093, AI307680, BE906048, AA985603, AA434527, AA358983, BG029042, AW016282, AI751352, AA904900, BE767196, AW751395, BE049123, AI538331, AI498177, AA428034, AW084403, AW085619, AW081391, AA461497, AW439261, AI081131, AI764997, AA761398, BE672411, AI634014, AW057677, BE221467, AW080458, AI244183, AW193005, AW339212, AW516122, AW027659, AW067803, AI954056, AW571944, AA772395, AI633339, AI916888, AI683203, AI422341, BE671235, AW025425, AI147736, AI090554, AI380245, AI089315, AW439080, AI282915, BF196022, AA351024, AI565421, BF476178, BE501181, AI205166, AW270733, AI751353, AI016528, AA135896, AI936764, AW024598, AI767080, AA135895, AA620766, AV707105, R10091, T49864, BF920348, T97167, AA399634, AI831497, AA152389, AA865196, AI277342, R50357, AW081268, R11029, BE503733, AA617807, AA649308, R11077, R10190, R53497, BF589988, N50819, R77618, AA399595, AA568975, AL525780, R72870, W68569, R71797, AA351025, R79394, AA912795, AW768731, AL524277, BF903645, AA894462, AL525820, H13235, H24510, BF568932, H30448, AA627105, BF340605, AW957565, AW067872, and AL133581.
HWHGQ46	1219	895880	1 - 1395	15 - 1409	AL515915, AL519637, AL516502, AL530378, AL534541, AL527244, BF206279, BE563468, BE894600, BF528095, BE734337, BE261458, BE547607, BF207129, BE018805, BE258538, AA314355, BF966160, BE259017, AI878986, BF527510, AW961100, BF218016, BF805533, BE935456, BE273252, BE935565, BE379416, BF689497, BE615561, BF805135, BG250649, BF805538, BG111006, W00898, BE394407, BF805707, BE543852, BE935562, BE538668, BG012784, BE797749,

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HNTOA59	1220	895940	1 - 3080	15 - 3094	W18181, AU118780, AU126249, BE739597, BF969172, BE874893, BG104700, BG167886, BE781278, AV758943, BF793394, AI335263, BG167884, AW977508, W60570, AW305247, BE739352, AI949857, AI769932, BE502280, BF033376, BF514535, AI961171, AI376764, AI018234, AW466903, AU145265, AI143581, W60661, AI498856, BG165828, AI949054, BF793906, AA569932, AA923566, AA873841, AI929237, W68384, H11953, AI051990, AI754510, H30442, AI190109, AI613113, AA456821, W68500, H18573, BE185505, BF248010, R60608, R16198, R16196, BE045974, R20002, BG166265, AA127202, H11954, R44819, R60554, H06599, W32128, H30393, H18466, AA374468, H30392, H30441, Z40835, AA767140, R16000, BF149232, R16197, AL537651, BE045981, Z41415, H88480, F08421, Z45096, N54033, AA127201, BF507730, AA662224, T16809, BE350273, T03447, AA224064, AA319784, AA095915, AI651893, AW877209, AL119457, AL119399, AL119324, AL042973, AW392670, AW804686, AW604723, AL119443, Z99396, BE695785, AW019988, AW861944, AW858526, AW858525, AW952414, BF868687, BE705905, BF868684, AL119497, BF868697, AL119319, BE705903, AL119483, AW363220, BE705906, AW577135, AW372827, AW384394, U46351, U46349, AW861889, AW858455, AL134920, U46350, AW962384, AW020592, AL119464, AW945168, AL134526, AL119484, AL119391, AI525653, AW951280, AV696791, AW963915, AW020328, U46347, AW020425, AW604726, AL042965, AL119363, AL119355, AW976035, AV727990, AL119418, AV660096, AW949477, AW963490, AW954384, AW023863, AK001292, AX030435, AJ251859, AX046357, AR060234, AR066494, AJ279014, A81671, AB026436, AR054110, AR069079, AF218031, T66654, T66655, T66656, and T66657.
HVVAL93	1221	895960	1 - 3182	15 - 3196	AL043329, BF965834, BG167996, BG026179, AI970994, AI740473, AI741566, AI817205, BF540943, AL529179, BE644852, BF439276, BF678309, AI740889, BF801570, BE544927, BF085261, AW466917, AI091411, AI435153, AI091191, AA129716, AI274064, AW117751, BG236187, BF439185, AA643517, AI753250, AI142000, AI436790, AI675270, AA133238, AI220185, AW204898, AW468944, AA421937, AI819042, BF034229, R69250, AA824389, F06421, H05999, AI742992,

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HAMGN09	1222	895968	1 - 1676	15 - 1690	BF445051, BE217908, AI760757, AW149808, AV701582, BE958089, BF978684, BG108510, BF212762, BF980565, AW119202, BE883295, AI761736, BF576059, AV751452, AA131230, BF212404, AI765261, AI767530, AI765764, BE733378, BF667664, BF979129, AI831450, W93041, BF184256, BE958309, AA705208, BE563928, AI097061, BF212980, AW103202, BE669851, AI703306, AW770620, BE564853, AA442700, N92163, BF670227, AI052295, AW104525, AV734527, AI949488, AA769675, AI076695, AA946840, AA584376, BE735250, AI056957, AI151362, BE565645, AI498453, AI219059, AI749495, BF477996, AI373382, AA769624, AI184579, AI241479, BF110713, AA705691, AI161059, AA834136, AI367960, AA921705, AA975611, AW514204, N64371, AA040363, H96401, BF998785, AW902158, AW384372, W93170, H96041, T76974, R11176, BE041209, AA370681, AW975187, AA370941, T77139, AA371282, AW015028, AA370936, AA040362, AA383071, AI597846, AI908359, AA807808, AI611793, AA131217, AV724520, AV718692, AV718489, AV719783, AV720464, D80253, D51423, D59619, AA333678, AV722801, D80196, D59927, AV720731, D80366, AV699927, AV718844, R07674, D80219, AV723927, D80045, AV720203, AV720812, AV701125, AV701043, AV701431, AV742001, AW973447, AV742667, AV701017, AV701248, D80134, AV701154, AV745080, D59275, AV700229, AV700889, D80193, AV699447, AV744934, AV719000, AV743601, D80227, D59787, D80240, D80043, C14014, D80210, C14227, AV719822, AV721784, AV742720, C75259, D81026, D51250, D80391, D50995, AV699479, AV701166, AV701332, AV701149, AV743008, AV720220, D59889, AV720211, AV701261, AV745724, AV745723, AV701021, AV701422, D80949, AV701118, AV701055, AV701012, AV720607, AV744768, AV745831, AV741012, BF243242, AV701443, AV719913, AV701163, AV741888, AV745369, AV745366, AV701428, AV723097, AV701344, AV744770, AV740535, AV701145, D80168, C15076, AV699746, AV719324, AV737584, AW949642, D80022, AV699550, AV744773, AV718707, D80038, AV701013, AV744771, AW965158, AV720150, D80195, AV742732, AV701335, AV745190, AV745847, AV743654, AV701121, AW964468, AW949645, T11051, D58283, AV701419, D81030, AV742671, AW949643, AV738340, AV745197, AV745920, D80188, AV746385, AV701330, AV741221, AW959570, AV745488, D51799, AV745853, AV746335, AV701130, AV741220, AV742048, T03269, AV721386, AV699669, D80378, AV718770, D59467, AV701227, AV700895, F13647, AV718800, AW975618, AV701415,

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HHEDS40	1223	896083	1 - 1616	15 - 1630	AU130933, BF972801, BF309067, AU117186, BE281461, BE296618, R17028, AA280686, AW955760, AW750970, AW806537, AA148980, AA334700, BE140280, AA374605, AW806552, AA333995, AW750968, AW938765, BE140198, R10471, BF772225, BF092276, BF696500, BG115878, AW806585, AA279407, BF092280, BF799535, BF800903, AW843338, BE140231, AW806467, AW971745, AI918731, AL119484, AL119439, AW604723, AW392670, AW858526, AW858525, AL134530,

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HBMBF28	1224	896325	1 - 1321	15 - 1335	BE513121, BG166812, BF976213, AA112166, W52962, BE775129, BE775109, AI654679, AA605186, AA313951, AA127531, BF852255, BF852536, AA129620, BF852282, T34127, W60439, BF852279, T23885, AA083967, BE391215, AA471251, AW085597, AI911400, AA783012, AW439249, BF852488, T10558, AI311253, AW273988, AW301875, T18528, AI310845, AI343313, AI583935, AW271874, BE049194, AI254460, AI583328, BF109512, BF991121, AI862292, AA729659, AI452749, BF436263, AA806351, AW664767, AA608519, AA102574, AA815210, AA458820, BG107975, AW999443, AW072615, AA902183, AW444896, BE467894, BE467873, BE219281, BF431719, AI733120, AI634529, AW188480, AF221130, AF213467, AB032252, and AF161435.
HJPAZ12	1225	896370	1 - 1460	15 - 1474	BE745631, BE798676, AW006921, BE740341, BG030427, AW006942, AI758245, BG115203, BE890368, AV726709, AI096483, BE734387, BG031776, BF306177, BE898636, BF034940, AI862446, BG026010, BG032290, AI949427, BE891167, AI927510, BE894095, BE871029, AI688715, AI949438, BE899208, BE542732, BG171529, BG034044, BE856314, BG114169, AI742409, BG036345, BE810270, BE082189, BE872791, BF306351, AW300174, AW612446, AW195534, AI631745, AI814307, AW172845, BE464497, BE674861, BE439957, BG166576, BF062474, AA934354, BF085122, AW170506, AI083694, AA024537, BF939907, AW166803, BE048747, BF109523, AI927519, AV753474, BE385486, BE898475, AI537457, BE326533, AA160271, AW002966, AA992203, AA282926, AA496948, AI310526, BF433911, AI628618, N95057, BE698697, AI431849, AI076811, AW190546, AI372954, BE046533, BF061582, AW271454, AI475865, BF195847, AW194708, AA553362, BE218026, AI741233, BE671041, AI741545, AW772014, BE767571, AW300052, AI653780, AA167276, BE906631, F30337, AA188875, AI935331, AA283136, AW630625, AI191807, AI127643, BE501561, AI241178, W72254, AA845315, AI434610,

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HISCV39	1226	896442	1 - 2715	15 - 2729	BE386747, BF313385, AU139053, AU133912, AU118931, BG023875, BE313242, AI046669, BE904361, BF970137, BE785783, AL517922, BE388188, BG114428, BF034447, BF093028, AW963991, BE378253, BF093078, AU129300, BE254743, AU129420, BE386011, BE392925, AU151443, BE546723, AU129248, AU154629, BE675999, AW025403, AI472148, AU151456, AI811059, AU151542, BF033164, BE439494, AU145379, AU158371, AU151407, AU144399, AA447393, AW408840, AU123483, D58723, AI139575, AI890927, AU145761, AA742462, AI800376, AW501970, AA447394, AA628966, AA654515, AA236994, AI888687, AA834615, AI394397, AA973832, AW770593, N72883, BF892957, AI913725, BF996184, AI570143, AI092335, AI805036, AW003614, AI803668, AI224536, AA446111, AI582374, BG056105, BF378835, AA877651, AA743851, AA411511, AI097064, AA576481, AI288292, BE869019, R91353, AW051468, AI936321, AI476393, AA889296, W22572, N74271, BF827295, BG009298, AA350263, AW515354, AA766834, AI082690, AA402357, BF851532, W27193, AA707912, AI539567, H29965, AA627820, AA099038, AI287346, AI906073, W22306, AW079133, AU156486, F10747, T58626, T81314, AW821349, H53387, H02136, Z39927, R85475, T79137, AA214490, AI678380, AW578259,

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HPTVU91	1227	896517	1 - 862	15 - 876	W93943, AA531276, BF680458, AA552438, AI831051, AW294768, AW273371, AA484181, AI609617, AJ403111, AI583153, AW973320, C00019, AW452730, AW878960, BF872746, AA627648, AW130295, and AR037875.
HSLJD02	1228	896743	1 - 965	15 - 979	AW752082, AW753053, AI905856, AW178893, AW966049, AV744934, T03269, AV744773, AV719468, AV718707, D80164, AW975618, AW964737, AW966053, AW960465, AW973334, AW966531, AW978634, AW966534, AW966560, D58283, AW966022, AV744770, AW959799, AW966013, D59859, D80022, AW966041, D80166, D80195, AW966029, AW975621, AW978648, AW966075, D80193, D59927, AW966065, AV741012, D51423, D59619, AW978661, D80210, D51799, AW965163, AW973470, D80391, D59275, AW960553, D80240, AV743601, D80253, AW973541, AV719822, AW964766, AW966054, AV718489, AV720203, AV718692, AW964756, AW966050, AV719188, AW973307, D80043, D59787, D80227, AW966062, AV719324, AV718440, AV718938, AV719783, AV720028, D59502, AW959597, AV718633, AW959628, AW965177, AV742667, AW975605, AW959570, AW177440, AV718800, AW973485, AV720211, AV718931, AV718844, AV720464, AV719557, AV718770, AV720731, AW959582, AV699447, D59467, AW958992, AV722801, AV723927, AV724520, AV721784, AV699550, AV699927, AW973474, AW975613, D81030, AV745080, AW960473, AW973423, AW965185, AW965197, AW965196, AW965184, AW973488, AW965175, AV720878, AW973482, AW179328, D80212, D51060, D80196, D80188, D80219, C14014, AV720791, AV742001, AV701125, AV701335, AV701166, AV742430, AV701149, AV701043, AV701332, AW960532, AV701017, AV701248, AV742048, AV742720, AW958993, AV701431, AW959136, AW956397, AW959062, AW964477, AW956434, AW964488, AW949641, AW949656, AW949654, AW949642, AW959202, C14331, D80038, AV744690, D80269, D80366, D57483, C15076, AW962082, AW178775, AW966043, D50979, AV744768, D50995, D59889, AW962245, AW360811, AW966023, AV701130, AV701419, D80134, AV701422, C14389, AV699746, AW366296, AW375405, AW966059, D80045, AW960454, AW973330, AW378532,

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HNHOF94	1229	896802	1 - 843	15 - 857	AW504168, AW407632, AW732205, AV718633, AI687343, AA678950, AV718938, AV749092, BF337291, AI284640, AW970571, AW193265, AL046409, BF055844, BF448904, AI613280, AU154166, AI270117, AI305766, AI350211, AI963720, AW468349, AI431303, AV764406, AI610159, AV759382, AI754653, AW472872, AA828704, AW276827, BE350475, BF794808, AV710066, AI334443, AI814735, AV761403, F29989, AW303196, AI251034, BE139139, AI250552, AI284543, AA491814, AV760937, BE047069, AV763354, AW103758, AI375710, AW301554, AI245693, AI345418, AW301350, AI251284, AV734666, AW274349, AA502860, AI345654, AI251203, AV762139, AW327868, AA469451, AV718908, AI688846, AI890348, AI223626, AI619997, AW193432, AV764307, BF475381, AV760774, BE138387, AI144101, AW302013, AF330238, BF857849, AW438643, BF683672, AI499938, AW303098, AV740801, AI341664, AW975425, AI061334, AA806796, AI254770, AW502975, AI826761, AA847499, AV758870, AI358343, AW378532, AW303176, BF793766, BG177715, AI289067, AW500125, AW406162, BE046438, AW088202, AV728425, AV762098, AI471481, AW268973, AW963497, BF746395, AV762050, R17793, AI613389, AL041690, AW965008, AI754955, BF851403, T74524, AJ633390, BF668217, BF677892, AI601229, BG249643, AW979031, AV760777, AA503283, AV764241, AW419262, AI049634, BF917346, AI570261, AA578861, BE042006, AA743968, AL037683, AW088846, AW340905, AW872676, AV760207, AV758994, AV759580, AV725423, BG099291, AW996768, AI246409, AW408767, AI537800, AV763971, AI053672, AW276435, AA630925, AW513362, BF918590, BF725121,

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H2CBM85	1230	896826	1 - 1863	15 - 1877	D79520, AA307713, T51211, D79560, AA164697, T51316, and AA164269.
HSLJC45	1231	896843	1 - 1169	15 - 1183	AL516920, AW964106, BE858245, AW795409, AW673478, BF114638, BF132131, BF679778, BG026583, AL516919, BF341615, BF217674, BE707558, AA099336, BF102691, BF954540, AA345865, Z44894, AA297234, AA125929, R24704, F05865, H26672, F08547, AA363324, F08631, BF229282, R17826, D60091, AR060756, AR064659, and AR080553.
HETJW92	1232	896874	1 - 1923	15 - 1937	BG261034, BE873193, BE870717, BG178811, BF036793, BG255133, BE380025, BG036667, BG254223, BE537632, BE379942, AA806214, AW965573, BF038191, BE180564, BE566251, AI910856, AA427513, BF036564, BE870823, BG036684, BF243233, BE538582, BE766499, H84673, BG180137, AI457792, BE180561, AA126879, T08550, BE871328, BF807078, BE539894, AA315096, AA134019, AI904879, H09290, R15941, F06590, BF038357, AI904853, AA453210, R35529, AA131851, T80473, F12752, BE548872, AW748181, BF431148, BE697942, AW015950, T74962, R56752, BE928469, BE868290, Z45897, H93521, R14640, AA338081, R12350, AW630088, AW674984, AI766506, BE868654, R14130, W38749, AW176253, AA430722, BF107388, BF184027, BE565590, BE018642, AA046853, AA385050, AA363860, BE719343, BE180554, W60935, AL045790, BF036293, BG179107, BF081700, BE148648, W21050, AA292157, BE180509, BF827222, AW998195, BE180614, AC009514, AL117612, AF087453, AX014821, and T66567.
HTEME02	1233	896919	1 - 843	15 - 857	AL536762, BF528330, AU140226, AW813975, BF339601, BF877029, BE834048, AI033712, BE699209, BF968237, BE695991, AV704911, BF843839, BE936062, BE936073, BF090166, BE936016, BF877036, BE936045, BE936021, AV722286, BE935949, BF090180, BG253555, BE699218, AW958768, BE008917, BE093398, BE935946, BE936081, AI907763, BE936067, BE008872, BF853428, AW897578, BE935954, BE936022, BE935984, BE936000, AI080415, BF362442, BF856881, BE935952, BE182983, BE182925, BE936035, BE935992, BE935956, BF843139, BE936006, BF815618, BF843841, BE182913, AW820982, BE936029, BG003478, BE699195, AI954084, BE936057, AW998139, AW935173, BE167347, AW407257, BE182944, D54061, BF852038, BE936071, AI807732, BF877047, AW820811, BE699198, AW964848, BE719419, AU149138, AW601176, BF746224, BE935981, BF876470, C04059, BF746143, BF820892, AI174699, BF852007, AW602654, BE008933, BE182912, BF812688, BF082986, BF229394, BE182981, BF877124, BE699192, BE182947, AI984573, AW748393, BF858057, BF852348, R98306, BE936072, BF751601, BE897718, BF734862, AA432282, BE936027, AW820825, AL041005, BE830405, AI564483, BF812628, BE838240, AA191629, H81609, T31059, BF229391, BE008977, BF962149, BF090176, AW379481, BE909785, BF902239, BE008877, BF375729, BF353448, AA131336, BE002031, BF852110, AW167226, AW580733, AV755738, BE008929,

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HTTBH18	1235	897055	1 - 2373	15 - 2387	AL520642, AI494412, BE693700, AW168998, BF063293, AI825776, BF132948, BE744137, AW467155, AI536969, AA629377, AI347598, AA130588, BF970939, AI802311, AI347474, AW052192, AI571862, AW070863, AA063623, AW007997, AA496434, AI597967, BF130696, AI768796, N93763, BF679386, AU153027, BF899815, R51785, AA525256, AA169356, AI889208, AI983041, H66516, AW582396, AW016601, BE817829, AW015966, AA169524, AA129710, AW960887, AA947350, AW014984, AW014415, BE770931, AI932541, AI949271, T67439, AW022052, AW517830, AI808859, AI092687, AA664956, AI017031, BF056952, AI218938, AW274021, AI185668, BF434501, AI039071, BF000553, AW629345, BF001499, AA725874, AA693604, AW242065, T87528, BE504107, N53667, BE219751, AA884894, AW612719, AI949723, AI393252, W56587, W73623, AA342548, AI340027, AI566026, AW571901, AW515639, AI434882, AI022045, AW970665, AW301286, R02181, BF839205, AI808035, BE217782, AW341806, AA279068, AA169871, R09308, BF221606, R08750, T87529, H42318, AI808036, AW772654, AA733025, AA489394, AA321098, T93900, R09276, R91186, AA524054, AI916642, N90095, H68702, R91140, AA404545, AA633153, BE817830, T55105, AI919113, H66517, AA804595, T55272, H66322, BE466157, R09172, AI766502, BE964325, W38554, R09202, AI370338, H46903, T69472, AA169565, AA089818, H46904, AI819069, AA036708, AW242977, H43086, W73671,

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HOGBM94	1236	897226	1 - 2152	15 - 2166	AL524908, AL522838, AL523970, AL526643, AL524638, AL526672, AL523969, AL524637, AL524907, AI126706, BE794117, BE798093, AL522839, AV655733, BE382404, BF969642, AI479847, AW192829, BG023810, BG179576, BF313172, AI279889, BE262983, BF207282, AI421809, BF314977, BE893705, AW248323, BE781659, AI768333, BF304264, BE539154, BE897878, AW006137, AW468336, AW072544, BE504335, AI741742, AL039221, AI611322, AW189019, AI969319, BE245491, AW474329, AI677833, AI122737, AA628927, AI270585, BF111442, BF207091, BE909947, AA526877, AA678843, AW972646, BF509049, AW514217, AI126518, BE244055, BE245616, BE780139, R61716, AI159845, R60720, AI494284, W44894, BF834449, AI088828, AW905107, BF527333, AW275109, AA480271, AI815186, AW905853, H61824, AW248087, T87354, AW590211, T95251, AI521942, AW590958, AI696055, T86573, AA010241, AI537065, AI800318, AA460778, W39542, F11857, R60721, T86750, T67464, H61825, AA206165, AA633710, BF804467, AI203927, AI624700, BF855013, BE502268, R51805, AA010204, AI800319, AW972451, R61717, H25779, BE261277, BF436295, AI184465, AW872818, N48718, AA460349, T78865, AA205932, T95252, AW190460, AW168744, AA278768, BF767959, BE175539, AA043867, BF511425, AI940174, T69497, AA044312, AA904823, BF738548, R51806, AI825526, AW150465, BF928026, AI934003, AW972648, C02494, BF965789, AI500029, AW411235, AV660258, AA127565, BG122594, BE901481, AW411265, AW410902, BE276577, BE393551, AI553640, AA830506, AW411351, AV686064, AI094639, AV706527, AI872906, AI917988, AW411043, E12646, AF192522, AF126781, E12579, A76335, AR068753, AJ277390, AF217994, A91160, AR054173, A93016, AL117644, S68736, S71381, AR068751, Y11254, AF065135, A76337, AR072149, AR072729, I92592, AR030544, AJ006417, Y11505, AL133636, AB025103, AR075041, X62580, AF036268, X62773, AL358133, AC021019, and M22640.
HSLAS08	1237	897262	1 - 2175	15 - 2189	BF686837, BF690587, BF686843, BF129618, AI908751, AI908746, AI908741, AI908747, AR072540, AR072534, I24403, AR084426, E02455, AX035427, A49701, AX035430, A92666, A92668, A92667, A92665, A00782, A02741, A14595, A18755, AR096518, AX018983, A94046, A94054, AR067785, E16475, I12245, I58322, I58323, I56770, I56771, A25856, A95106, A95105, AR038762, AX001322, Z96332, I96211, AX024519, AX024530, AX024508, AX024541, AX024497, AX024552, I01012, AX000478, AX000480, AX018968, AX000474, AX000476, and AX018972.
HTLJA52	1238	897328	1 - 1150	15 - 1164	BF979319, AW119073, BF062352, BF059117, AW027493, BE501011, AI393331, AI066607, AI637906, AI198866, AI654236, AI962816, AI209196, AI220535, AI798943, BE671645, AA776779, AI650410, AW631146, AI377343, AW304013, AA994513, AI632454, AW614024, AA962362, BF062007, AI150204, AA757242, AA883138,

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HISCG60	1239	897517	1 - 1710	15 - 1724	AA098949, BE170936, AA085520, AA340319, BE252421, AA731691, AL042853, AA579179, BF681619, AA355749, AL042756, AI334443, AV758790, BF678990, AL042420, AW974932, AV756809, AW265393, AW069769, BF337291, AL037683, BG249643, AL042753, AL138455, AI733856, AV755654, AL079734, AA527209, AW966333, AI636627, AV760391, AV763418, AV759935, AW062724, AA828047, AV763276, AI358712, AA584489, AI754653, D87432, AL133448, AC009086, AC008738, AC005000, AL117258, AL034417, AL139099, AC008805, AL353810, AL035420, Z68276, AC005399, AL121919, AL355365, AL035401, AC005971, AC005874, AF134471, AC006088, AC006950, AL161901, AC006314, M30688, AC006115, AC008745, AC004686, AL034422, AC010352, AL121891, X54486, AC005225, AC007671, AL354696, AC005701, AC008543, AL023575, AL135796, AP001690, AL049552, AC002073, AC005261, AL121897, AC008687, AC004655, AC011482, AC005052, AC002301, AC026431, AL137802, AC026881, AC005899, AL357497,

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HEBFI34	1240	897852	1 - 1175	15 - 1189	BG250493, BE786038, BF968793, AI148564, AV714668, AI911259, AV717040, BF970799, BF031366, AV701362, W60958, BE221213, AI683823, AW268612, AW275920, AV711084, BE551456, BE551386, BE550880, AA404358, BE669452, AW956755, BE674209, BF669035, BG110482, BE504275, AA443743, BF244446, AI271616, AV703458, AI675766, AA936391, AV763474, AA403095, AI311856, AI695003, AI082141, BF968311, BF381847, BE905833, AI079408, AA503819, BF036575, AA393808, BF027805, AI189388, T86418, BF575757, N30670, AA393892, AA974212, AA827290, BE872085, AA910984, AV711478, AI014740, AA804216, AI219049, AI566294, H96780, R21152, AI374805, AW804422, H23300, AI299755, R99539, N75557, R99538, AA476793, AI094470, AA417638, AW952564, BF724670, BF221760, AV725011, W05584, AI133161, AI089034, AA905867, AA677753, T86508, AI240536, R99550, AI538267, BF753822, AA335337, BF811514, AA918453, AA313386, AW445161, Z40615, H92649, W87796, BE272827, T33983, AW298229, R08382, BF475310, H23186, AV714823, R08329, H96103, H97711, H80948, T99199, N24555, AA375092, T99198, BE260997, H92437, AA383378, BE536680, AI085108, AF242523, AK024574, AF151859, AC004148, AC024082, AC009263, and AA419545.

HKAEK20	1241	897885	1 - 1115	15 - 1129	BE872600, BE744440, BE392074, BE747852, BF437467, AW294718, BE280077, BF594560, AI362833, AI499710, AI005303, AW168051, AA587270, AI885622, AI394581, AI376592, AA833957, AW665636, AW510777, AW663550, AA236899, BF437501, AI937063, AI879044, AI129399, AI937892, AI051543, AW005685, AI333338, AI369653, AI343383, AI088461, AA632126, AA991269, AA552172, AA452977, AI032294, AI023445, AA502369, AA452992, AA777053, AW026878, AA452854, AI401110, AW008913, AI186769, AI672668, AL079826, AA868216, AA428130, AA527466, D60193, AA927983, AI364308, AI220907, AI668901, AI685820, AA236629, AA127786, BG057425, C14825, AA989539, AI419950, AA541273, AI695610, BF792826, AW503283, AI525510, AA374931, AW206263, AI394097, AI910623, AA127687, BE253223, AA455557, AI916665, AA887800, AA452835, AV756074, BF337291, AL042694, AV704232, AL042538, AI432644, AW405497, BF812963, AV760560, AL042853, AL042377, AI582932, AI866820, BE047915, AI433157, AI866469, AI355779, BF811804, AI889189, W37242, AI491710, BF343283, AW151136, AI590043, AI538885, BE883591, AI801325, AI500714, AI872423, AI537677, AI500523, AI859991, AI500662, AI888661, AI581033, AI860003, BF342223, AI521560, AW511921, AI923989, AI284517, AI539800, AL079960, AI500706, AI494201, AI815232, AI539707, BG029667, AI284509, BF970652, AI890907, AI554821, AI866465, AI539771, AI648567, BF811802, AW611588, AI538850, AI690946, AI866573, AW172723, AW858243, AW151979, AI539781, BF338002, BF109506, AI805769, AI434242, AI436429, AI623736, AI866786, AI610557, AI242736, AW827115, AI828574, BG252929, BF812961, BF815930, BE897632, AI371251, AI500659, AI887775, AI491776, AI445237, AW151138, AI582912, AI889168, AI440263, AI633493, AI889147, AI371228, AI440252, AI434256, AI887499, AL045943, AI284513, AI559957, AW089557, AI521571, AI469775, BE537531, BF030996, AI866510, AL046137, AI866461, AL515375, AA948539, AL047422, AW020592, BE886728, AL039390, AW827289, BE895585, BF812438, BG110517, BG027628, BG180273, AI923046, BF676355, AL046595, AV762619, AA641818, BE796673, BF812936, BE536058, AW673679, AL048482, AC005522, AL391122, AC007383, AC020910, AC007390, AF001552, AL354861, AC010137, AL031274, AL139099, AL353745, AL135749, AC005902, AC087089, AL353625, AC002464, AL031984, AL138836, and AC008074.
HDPVZ07	1242	897891	1 - 1325	15 - 1339	BF794893, BF528477, AV726101, AI890191, BF590669, AW197500, AW051933, BG024915, BE670318, AA989050, AI652622, BF447720, AI968150, AW089773, AA701627, AA931239, AA864813, AI914055, AV646097, AV708676, AV646062, BE074869, BF841082, BF934574, BF934575, AI580744, AA323534, AI017130, AA931926, AA976815, BF366013, AA621535, AA043634, BF347990, AW206671, T06881, BF922278, BF922271, AA033736, BE930520, AW383773, AW383776,

					AW606263, BF841093, and AW151114.
HE8PB56	1243	897898	1 - 2007	15 - 2021	AL513926, AL513925, BE621616, AW960757, BE621361, BG033574, BE879071, BE409836, BE122868, BG166428, BE905399, AW998966, BF967614, BG111599, BE565434, BE566493, BF965367, BE736870, AV658844, BE787412, BG032045, AV658848, BF967540, BF037996, BE910300, AW167175, AI740811, BF827073, BF825996, AI814625, AW372977, BF691552, AW379570, AW966626, AI830090, BF432483, BG165775, AA843925, BE811643, AW372976, BF382175, BE565581, BF982073, AW269507, BE563938, BF790484, BE876947, BE866746, AW379557, BF063395, AI378931, AI817634, BE973779, BF668149, AI858698, BF208111, AI828457, BF692349, AI694126, AW392769, BF246378, AI830092, AI422742, BE185114, BE567089, BE569169, AI400366, AI092688, BF669067, AI890963, BE348964, AW604280, AI679511, AI913025, AA253194, AI419413, AI811323, AI951020, AI022434, AI683943, AI525592, AA568164, BF028353, BE811634, AW675760, AW604289, AA688138, BF185347, AW630052, BE075317, AI452382, AI146463, BF382673, AI400768, AI288461, AW591233, AA906505, AI924309, AI167393, AA654360, AA186897, AI004583, AA775509, AI493331, AA614431, AI346389, AW604287, N62092, AA626034, AI023936, BE566929, BF572226, AW043643, AW273008, BE714766, BE140293, AA159711, AI921444, AA159816, AA482352, W38893, AW268508, AI970751, AV752826, AV651228, BF208866, BF840505, AW627852, AA588751, BE710423, BF184750, BE140199, AI077673, AA016243, AV658613, AA586975, BF675470, BE568879, AI985699, AI587086, AI860660, AI475132, N95055, BF475684, AI075057, AW274617, AW304099, AA160381, AA506029, BG119917, AW238652, AA086218, AA482254, AI436339, AI291597, H99748, AI278514, AW510468, AA610151, AW999091, R63720, R70906, AA471074, AW472934, R77169, AA079633, BE714760, BF240062, AA480373, AA468385, BE140282, BE737195, AW302595, AW806670, R82584, AI446687, AI283412, AI816752, H97740, BF840503, AA932817, R82585, W93394, AI682734, AA844033, AV682749, AA639961, AI880674, AW104925, AW261859, H21696, AI291596, H01942, AI168626, AA935864, AA580370, AW873776, AA258741, AA618219, W93362, AA258377, BE814374, BE218377, AW238247, AI190841, AW604657, BF082736, BF345003, BE934633, BE181669, AI091676, AA328654, BE544155, AI932899, C17106, BF588467, AA297487, AA159815, BF211913, D79077, AA158761, BE710924, AW134560, BF326845, W79646, AV656657, AA296799, BF212328, AA159710, R63767, BE566272, R70905, AV657130, AW673433, AA159565, AW999382, AI472890, AA298549, AI492053, BF130354, BG107992, AA016203, R70993, BF208278, AI811530, AA469417, BE567023, BF812789, AA076609, AA468424, AX013182, AJ251830, AL023582, AF317550, AF249870, AL355362, AF251009, AK027096, AL389935, X70685,

					AF113019, A18777, AL080110, AK027164, Z97214, AK026855, A52563, A12297, AF151109, I48978, AB048919, X72624, E01573, E02319, I89947, AL050277, AF143723, E06743, A23630, AK000421, E12580, AK025239, AF261883, A08907, AF131821, AL117626, AF119909, I17544, AL050155, AR068466, AL137480, U77594, X66871, AF028823, I33392, AF132730, M27260, AX046405, AK000690, AL049283, A08913, I09499, AL137488, AL355701, AX026824, AX026823, A58524, A58523, A12522, AF118094, A08912, A08910, A08911, AK026649, A08909, AK026045, AF218000, AX015425, AL110218, AR038854, AK026462, AF031903, A08908, AK027181, AF031147, AK025015, AB047966, AF039138, AF039137, A18788, S76508, AJ012582, AF065135, AL080154, AK000285, AL359623, A45787, AL137275, AL117394, AL050138, L13297, I18355, AK000418, S36676, E02253, AK026057, AR085690, U35846, AB040710, AF116646, S77771, AK027142, I89931, AL117648, AK026389, Y10080, AF097996, AB047897, AK027169, E12579, AK027137, AF114168, AL137529, AR029490, AR087170, AR068753, AK026542, S83456, AF116676, U92068, AF177336, AF183393, AK024747, AK026647, Y10655, AX016706, AF117959, X76228, X87582, AK027121, AK026528, AF215669, AK000137, AL137523, AK026541, AL157464, AL137648, AF110640, AK027146, X55446, AF185614, AB050431, AK027188, AK025708, AL389939, AL157482, U78525, AL110222, AL133606, AL157433, I68732, AR011880, I89934, A93016, E08516, AL035458, AR068751, AL162083, AF116688, AF090934, AF130056, AL359620, X83544, AB050418, AK027082, AL122106, AF218034, AK027160, AL137574, AB047631, AF177401, AL080148, AL137294, AL096751, AJ005690, AL137550, X98834, AF130102, I08319, E15569, E02914, AK024524, Y11254, A76337, AR072149, AK025549, A76335, AL442083, AK026630, I92592, A91160, U37359, AL049466, AF044323, S68736, AL389982, AL137665, AL110269, AF081197, AF081195, AX019230, AK026600, AC004213, AF151076, AK027095, AF087943, AL137530, AB048954, AK025092, AL161953, AK000310, AF184965, AL136842, X65873, AF000145, AJ004832, S78214, A21103, AL110171, AF116670, E05822, AK000445, A90844, AB050510, AK026744, AK027173, AF116644, AL390184, AF111849, M86826, AL117649, Y09972, E08631, U73682, AL137521, AF090901, AX019229, AF140224, AL050310, I48979, S54890, A65965, AB019565, AF130058, A57389, AK026086, AK025391, Y11587, R23770, R26913, R32172, R32216, R38317, R39395, R70940, H04495, H21906, W93606, AA076610, AA079807, AA188520, AA253195, AA583881, AA631038, AI000172, C00038, C17487, T24990, T48546, AI350112, AI369025, AI202629, AI436481, AI474703, AI471235, AI561317, and AI572472.
HCFBF02	1244	897932	1 - 2587	15 - 2601	BF718797, AL530914, AU122015, AI761694, BF038798, AA449050, BF975260, BE735899, AU134674, AW968498, AV684895, BF203871, AV684924, AV683742,

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HE8TB14	1245	897937	1 - 2864	15 - 2878	BG166696, AW167360, AI267409, BE771015, AW964621, BF724809, BF116223, AW957228, BF513241, BE044455, BG028972, AW341018, BE717076, AI741238, AW205267, AA446366, BE716007, BE770995, AW967837, AI631041, AW068733, W38381, BG055388, AA631768, BG109533, AI678459, AI190188, W22773, AI298033, AI185111, BF109466, AL121396, AA825376, R51682, AA322968, R17294, AA326583, D51829, AA319660, H52339, W40456, AA322218, AA322915, AI884382, AA333546, BE246888, AW888726, AI817750, BF354697, AI694949, BF110569, T71507, AA057393, BF795799, AW968859, AI559589, AI272250, AA332395, AA909847, AA491176, AA339517, AA868436, AA028178, AV749029, AA101311, AI472353, AW236635, AI701159, AW661978, BE974135, Z44341, AA027301, AI499254, AW850031, AA027305, AW605429, AL044855, W07057, BF803712, T39302, AA636080, BE882592, AI795880, BE247681, BE769002, AL044038, AA923313, AW952401, and AB007930.
HHEFI15	1246	897968	1 - 1762	15 - 1776	AU133538, BE312889, AU117464, BE743205, BF689738, BE903831, BF982377, BE260664, BE261205, BF797573, BF206958, BE543465, BE313854, BE261633, BG180460, BE903131, BE313739, BF751473, AA195176, AW956388, BE386393, BE250817, BE410483, AW673389, T74083, N77796, R94656, T86367, BE799343, R20378, Z44821, BE141418, AU128632, AW292756, BE542704, Z44796, R36742, AL040203, F05149, R17945, T32211, BE727543, BF360245, BE407445, F12532, AV747894, BF349518, BF690283, AA309174, AA135353, BE251320, AI283551, BF814397, AW750971, AK025999, AK022940, AK024657, and AK000926.
HHEQF50	1247	897970	1 - 617	15 - 631	AA350429.

HOSAY56	1248	897979	1 - 1293	15 - 1307	AI949910, AV716802, AW242656, AV716725, AI400631, AA418441, AI338670, AA446401, AA677149, AV711676, AI333747, C01555, AA380065, AA700481, AF067800, AJ133532, AF109146, AF200738, and AC006511.
HOGEA82	1249	898097	1 - 1931	15 - 1945	AW603958, BE514890, BF819737, AW084511, BF772865, BF819736, BF883707, BF819740, BF819735, AI921127, BE872017, AW603961, AW081362, AI826371, BE047831, AA633240, AA573892, AW438692, BF819488, BF819602, BF819738, BF819733, AA670097, AA746062, AA773277, BF822599, BF819739, BF819590, BF883124, AW850118, BF821487, AA527939, AA101930, AA132986, BE827167, AA551538, AA101929, AI827670, AI566178, AI279935, AI991843, AI624645, AA132631, BF822589, BF823653, BF773151, AI911191, AW603959, BF773143, AA135196, AA972356, AI288048, AI566277, AA133085, BF803415, AA936755, BF851703, AI803847, BF822577, BF822628, AW997240, BG002642, AW752282, AW997219, AA987392, AI925474, AA336198, AW167866, AA135276, AI884517, AI432597, AW351818, AI690524, BF921923, AI866644, BF819734, AI561306, AI591335, AA570337, AW814683, AW242240, AW351801, AW750746, BF921927, AA366320, BF921922, BF821533, AI914681, AA535954, BF773142, T24909, BF821500, BE327605, BF773137, AA132448, BF821663, BF921918, BE143260, AW850138, AW850422, BF928797, AA534508, BG034554, AI929108, AW161098, BF752892, AL133741, AA629936, AI365256, AL110306, BF830213, AI815239, AW084097, BF828245, AW020455, AI333638, AW020592, BF913569, AW022494, BF813177, AI610645, AW020288, AI469516, BE965481, AI886055, AW021588, AI254727, BF764516, BF154735, BF764534, BF753056, AI677797, AW130829, AA207067, BE971692, AI499974, BE904809, AW827285, AW022542, AL138388, BF811808, AL042382, BF968959, AW089006, AI343091, BF749516, BG106858, BG058039, BF924884, AL041220, AA731026, AL035847, AW168791, AA806719, BF526933, AW806761, AW131994, AW081917, AI473434, AI860697, AI873638, BE906419, AI358107, AI630947, AI805769, AI250627, AW078689, F26535, BG114432, AA768046, AA830821, AW022102, BF819346, AI628273, AI434242, AV681965, AA514684, AW858254, BF892007, AL513585, AV733448, AI002285, AI247298, AI553669, AV710937, AV743129, AI471548, BF766527, AI560806, AW900453, AI244380, BE011885, AW085786, AW265004, AI863047, AW827249, AI799233, AI360195, BE974031, AW148303, AI887775, BF794025, AI249946, AW149876, BE964497, AI446405, AI559863, AV746791, BF343205, BF814449, AW999906, AW268962, AW002698, AW025279, AW827201, AI452857, AW235482, AW083804, BE909521, AI364220, AI951222, AI696626, BF816031, AI096771, AI587489, AI887139, AA493923, AI927233, AI589993, AI950973, BF037484, BF773282, BE538466, AW827289, BE393551, AW078729, BF817746, BF814429, AW055252, BE279800, AI472536, BF915316,

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HHFJV91	1250	898152	1 - 1294	15 - 1308	BF590328, AI273419, AL529541, BF930216, AI096740, AA041295, AA041399, AI418107, AW751573, AA041347, AV721082, AA888485, AA558031, AU143384, AU160484, AK024046, and AC007739.
HMACM29	1251	898193	1 - 1061	15 - 1075	BF343916, N30858, BF438499, AW517119, AW974158, AI301873, AA133244, AW304912, N50741, AA044688, AI148515, AA133297, AI991673, AW072019,

					AA133495, AA115735, AI648557, BE044046, AI198313, AA569871, N41388, T69995, Z20305, N55062, AF213457, AL133404, and A74711.
HDPLG70	1252	898235	1 - 1899	15 - 1913	AL520900, AL520550, AL520551, AL521649, AL520901, AV704088, BG029889, BG120878, AW372721, BE264987, AA779652, AL037829, BE906201, AL044300, BG170969, BE782595, BE891253, AL037830, AW372704, BE768930, AA722880, BF724791, BG104612, AA447813, N21569, AI168324, BE349318, BE047392, AW131642, AA478642, AI590628, AA292897, AA410845, AI829611, BG254734, R52846, AA447814, AI142945, AI142943, AA252189, AI359892, AA974206, BF508776, AI190425, BE350039, AI085888, D59872, AI446645, AI335769, AA861454, AI268764, AA776515, AI077663, AI806892, AW083118, AA554318, AI439022, AI373036, BG164250, R66420, AA302641, W73952, N42730, AA594115, AV683614, AI249488, AA936827, AI917956, AI367631, AA156886, AW511599, AW151261, BF915540, AA235619, W77995, AA252188, W73178, D59873, W73457, AA678939, BF767379, AW960535, AA447665, AI050013, AI433148, AI693776, H43132, W93317, BF872750, AI868651, BE907089, H42365, AI215882, AA383684, AA843578, AA479185, H84184, AA421010, AA766077, BE171426, BE171433, C21518, AI274524, AI015576, F21903, BE171427, AA625709, AA535245, AW265759, AA927039, AA303411, AI684069, AA339998, AA356903, AA325207, AA811142, AW372719, AW239545, AA401731, AA742390, AA336082, AW081250, AA433985, AW372678, AA603705, H84185, AA157195, AW372679, AI910669, AI682063, AL044011, AW273621, AA827896, AW170714, AI028476, AA496243, AI582763, AA916824, AI057210, AA768150, AI440289, AI721078, AA634528, AA621271, AA776421, AI051711, AI287476, AW303838, AI636557, AA961201, AA815460, R06079, AI076520, AA773592, BF736165, BE171275, BE008133, AI222486, T24558, AL521648, AV726846, AV704757, AV706824, AV705873, AW963450, AI525633, and AI369290.
HABAD39	1253	898401	1 - 1781	15 - 1795	AL517391, BE902734, BE898760, BE734218, BE898456, BF969683, BE741858, BE740173, AW411437, BE798298, BE787731, BF207078, BE314398, AI953080, BF206749, BE312960, BF983948, BF735902, BE272107, AI755152, AI085362, BF678960, BE292874, AA402892, AA156214, BG255037, AW006183, BE269007, AW953338, AA813449, N29136, BE739234, AI361967, AA542904, AA738475, BF571520, AA948078, AI278491, AA102825, AA314817, AA476582, BF438195, AA282290, BF303733, AA428795, BG109160, AA608565, AA057850, AA631291, AI199707, AA102826, N42950, AI627467, AI499849, AA401361, AI814330, AI143537, AI421793, AA402059, AA889293, AI310494, AA101640, N29804, AA828527, AA125896, AA602166, AA405320, AA427673, AA027054, T72902, AA125895, AA101639, AA605034, AA330261, AA398667, N49925, AA351311, AA713830, R95693, AA505799, H56340, AI914562, AA846244, BF437539, BE082341, AA749355,

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HKAKC86	1254	898524	1 - 811	15 - 825	BE563611, AI028704, AA758208, AI743546, BF028445, BE879604, AW971745, AW804686, AW392670, AL119497, AW861944, BE695785, AW604723, AW858526, AW858525, AW877209, AL119457, U46341, BE705903, AL119335, Z99396, AW384394, BE705906, AW861889, AW577135, AW372827, AW858455, AW363220, U46347, AL119319, AL119443, AL134533, AL119324, AL119363, AL134902, AL119484, AL119341, AL119391, AL119444, AL119355, U46346, U46350, U46351, U46349, AI142132, AL119483, BF868697, BE705905, AL119396, BF868684, AL134531, AL134528, AW604726, BF868687, AL134920, AL119439, AL119522, AL119496, BE705904, AL042614, AL119399, AW861954, AL037205, U46345, AL042975, AL134538, AL042965, AL119418, AL042450, AL079683, AL043029, AL042544, AL042970, AL042542, AL043019, AL042984, AL043003, AL042551, AL119464, AL119488, AB026436, AR080280, AJ251859, AX030435, AR054110, A81671, AJ279014, AR060234, AR066494, AX046357, and AR069079.
HUKEP18	1255	898588	1 - 852	15 - 866	AA203189, BE672200, AI057441, AW139922, AA719156, AI653844, AW104223, AW593290, AI208345, AA969188, BF886843, and AF100707.
HL2AE66	1256	898739	1 - 1098	15 - 1112	BF794010, AU118289, AU137988, BE622368, AW610165, BF346601, AV762918, AW393434, AW880979, AW364631, BF375671, AW385620, AA343317, BE832861, R70298, H44267, R71697, BF925881, AW393440, AW610168, BF375691, BE843942, BF376968, BF375683, BF375703, BF375681, AW796249, AW364623, AW393437, AA781867, AW385613, U25890, BF991525, AA337569, AW960792, BG014480, AV762940, AK001005, AK002056, AC005840, and AC006064.
HHGDQ67	1257	898746	1 - 1881	15 - 1895	AV728436, AV693005, AV709635, AV687176, AV703125, AV685688, AV701198, AV725989, AV650367, AV729411, AV716834, AV705555, AV645778, AV703970, AV745573, AV727314, AV707149, AV692972, AV725431, AV704269, AV726480, AV755534, AV726559, AV734181, AV702787, AV707117, AV706910, AV729017, AV734855, AV702984, AV724987, AV727103, AV707088, AV705234, AV701538, AV703591, AV704974, AV707948, AV734426, AV702869, AV728459, AV728715, AV656240, AV701728, AV733212, AV707783, AV702954, AV733296, AV733813, AV725074, AV706183, AV734581, AV709407, AV647654, AV734568, AV707690,

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HHFJS83	1258	898792	1 - 1789	15 - 1803	AL517134, AL524051, AL517135, AL537535, AI361222, AL537534, BG120134, AL532423, BF688163, BG150261, AI361218, BG168891, BE868208, AI818146, BG168918, AW955091, AL044002, BG167519, AV719782, AW510853, BF216510, BF037045, AA449562, AL515196, BF030580, BE885418, BF699219, BF680792, AI937067, BE927666, AW292803, BF335422, BE549610, BF793793, BE927669, BF674861, AA620750, BE881703, BF672590, BF111213, AI809804, BF668534, AW444975, AI937064, AL044003, BF085327, AA643669, AA314350, AW571754, BF085414, BE927615, BF367442, AI333293, AI027392, AI870371, AI268405, AW804029, AW804094, BE814966, BE004566, BE814989, AW804038, BE178594, BF381744, BE814978, BE694316, BE825418, AA523074, BF516003, BG150351, AW804040, AW804031, AI140675, BF310866, AW804096, AW935907, BE815035, BE273207, N51364, AI159864, AI949007, AI279860, AA449305, BE178632, W52337, AI912517, N66531, AI056498, BF085618, AI344560, BF217506, AA908864, AI571128, W48833, AA448734, AW887696, AI356775, W52594, AW954918, BF085472, AA515676, AW102597, AI825137, BF197164, BE004562, AA845306, AI289220, BF689123, BF433188, AA084404, BE178588, BG107076, AA448757, W49814, BE178649, H12900,

				AV756035, AW189236, BF131783, AA448798, AI460069, AI830723, H99378, AI313393, D82523, AW804120, N57002, AI423892, BF382604, AW887694, N89941, AW887703, AI423765, AI348377, AI423619, AA772080, BE004603, AA961085, AW887709, BF085333, AI380140, BF085413, D60492, AI225085, AI244153, D82499, N64261, BE089349, AA907447, AW241615, BE089348, AW001668, BF352382, BE825346, BE089337, AI767167, R48783, AW472798, AW052165, BE815028, BE814984, R15770, BE815055, AW024854, H00809, D57482, H16913, R17701, T80286, R16274, BF327548, AI655533, D82446, R28195, H08546, N88488, H15987, F09950, W19356, Z30216, H12901, BF677346, T30774, AV725074, AA309056, AA340229, R48890, BF327564, T95183, D82493, AW089369, C02460, R28196, D57590, T95086, BF437738, R38734, D82563, AA384328, AW440038, R18554, BF327550, BF243577, AA081556, BE004951, W33131, T34027, H16803, R56288, BE004551, BF691993, D82528, BE927693, BE927656, BE004811, D54250, W31584, D82529, W33132, T11295, W32076, BF132161, BE815060, BE004800, AW804018, BE004907, AL515195, BE004864, AW804090, AI674883, AA318911, C02521, AW887690, BE815026, BE856297, BE004960, BF327561, R12855, AL514627, BE048071, BE018334, BF970449, AL049085, AL040243, AL514793, AC006033, I48979, I89947, AF130104, A08916, I48978, AL122110, AK025084, AL133080, I89931, A08913, AB041801, AL133560, AK026045, AL162062, AL050149, AX046603, AF130075, AL122093, AL162083, AK024538, AK025092, AL133075, X65873, AF130077, AK026741, AL117457, AL122049, AL110196, AK026865, AF106862, AF113690, Y16645, AF097996, AK025391, AL122050, X84990, AK000618, AF090903, AX019230, AK025772, U42766, AK027096, AK026583, AF113699, AL133016, S68736, A03736, AF090900, AF119878, AL049430, AF225424, AK026744, AF130105, AF119875, S78214, AB052200, AF130082, AL122121, A08910, AF090934, E07361, AL133640, AL137459, AL117460, AL133557, AK026927, AB019565, AX019229, E03348, AF113689, AB048953, Y11587, AJ242859, AR059958, AL359601, AF116649, AF177401, AF090901, AK000445, AF130092, AL080124, AB049758, AL133606, AL049938, AF116639, AL117583, AL050146, AL050108, AF130110, AK026086, Y11254, AF113691, AK025339, AF116631, AF116602, AL080060, AL050393, AL122123, AL389978, AJ000937, AR087170, AK000212, AF119899, AF116646, AL110221, E07108, AL050116, AL117435, AL133565, AK026855, AF113694, AF116688, AB051158, AF118070, AK000137, AF119871, AK026959, AL390167, AF125949, AF113676, AX006092, AF158248, AL157431, AF090896, AL137527, AF104032, AF118064, AL133093, AB048964, AF218014, AB047615, AK026608, AF116682, AL359596, AK025958, AL162006, AF017152, AF219137, AK026452, AR079032, L31396, AL080137, L31397, AF091084, AF116644, AF113677, A93016, AL050277, AF138861, AL049452, AL389982, AF113019, X82434, AF090943,

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HSUMA53	1259	898943	1 - 3126	15 - 3140	AU132597, AW375619, BE147950, AW375590, AI954621, AW362044, AW846423, H98087, AW205215, BG116625, AW754108, AW205991, AI361588, AW193731, BG115317, AA588837, AA534307, AI631442, AW291638, AW846522, AW846520, BF997465, BF997460, AW846509, AW846513, AW408128, AW751986, AI097266, AA731997, AW957659, AW965952, H89823, R98300, W01922, AI656446, BE612963, BG115275, AW500884, AW846344, AU123814, R98059, AW968355, AW972093, AW968356, AW968729, AW972091, AW972092, AW969229, AW971740, AW972090, AI432644, AI623302, AI431255, AI431337, AI431351, AI432654, AW128900, AI432658, AI432674, AI432661, AI431346, AI791349, AI432675, AI431353, AI431347, AI432653, AI431230, AI431328, AI431354, AI432655, AI431310, AI431312, AI431241, AI431345, AW081103, AI432677, BE672759, BE672774, AI431254, AI432651, AI432647, AI432665, AI431357, BF448552, AI432673, BE672745, AI432649, AI431243, AI492519, AI431330, AI432672, AI431248, BE672719, AI432662, AI432676, BE672767, BE672749, BE672748, AW128846, AI431340, BE672792, BE672738, AW128897, BF589777, BE672732, AI432664, BE672742, AI432650, BE672744, BE672743, AI431307, AI431316, AI492520, AI432643, AI492509, AI431751, AW128884, AI432657, AI431352, AI431247, AI431356, AI492510, BE672644, AI431308, AI432645, AW129223, BE672626, AB006624, AC018673, Y17793, AX030435, AX030436, AF064854, AR071207, AF019249, and AF048686.
HHFNI70	1260	899099	1 - 2355	15 - 2369	AV722410, AW960074, AW956729, AW183039, BF107215, AA046671, AI708530, AA081351, AA046747, AI453527, AI151441, AA682494, AI342481, AI480375, AI470227, N69434, AI091530, AI087965, BE439808, AA693935, W69477, BF940071, H69328, W03259, AV733213, W03670, AI032588, AW293109, AA923465, AI052329, AA693582, AI470914, AW961536, H57840, AA463325, AI160641, AA693904, D63041,

					BF438812, BF197662, W87483, H59965, AA704407, N80143, R76756, AW021291, W87511, H93850, BG012717, R76413, AA340162, D79275, H72432, AA576601, R71437, H78909, R93568, H02824, D63040, AA297240, T96905, H02823, H93538, H80143, T40526, AA135754, R71091, D62918, AI378999, W69476, AA081350, AV749159, H72343, D62168, T96904, T39345, R81660, R96867, R24376, AA029421, R81462, D56989, R24267, AA347305, AI057367, AA297532, AA054727, AA029420, BF086058, AA135665, BE767809, R93569, F35420, D62882, T83800, BE767810, AF118108, and AF127670.
HLHCH09	1261	899172	1 - 1758	15 - 1772	BE563419, BE907794, BE563484, BE562400, BE743983, BE740414, BE744931, BE561772, BE867597, BE561159, BE728270, BE396947, BE562032, BE549277, BF916758, BE743617, BE250039, BE562362, BE272401, BE746660, BF916759, BG109047, BF970916, BE568812, BE974183, BE541095, BE871927, BE698579, BE871269, BF196344, BE698577, BF037459, BE698578, BF818581, BE698576, BE698574, BF916525, BE305089, BE709697, BF816476, BE866320, BF676007, BF132539, AW804494, AI312113, BE709749, BF914938, BE927878, AI979207, AA741250, BF677728, BF770846, BE792267, AW009598, BF818090, AW952036, BG123012, BF676772, BE268930, AI590808, N20044, AW192453, BF820875, AA152150, BF835354, BE866069, AA101561, AW583700, N28398, AA483522, BF846233, W76302, BE162549, BE709576, T40695, AI241578, R72982, BG013078, AA224590, BF818208, T87045, BF033572, BF834943, BE241748, BF836755, AI955238, BG010167, R28222, R02633, BF818279, BF803095, AA244018, AW338261, BF770534, T39606, AA304161, AI925871, BF839692, BF868424, T86963, AI864718, AA227408, AI333843, BE350662, R27969, AW994103, T39607, AA215609, T84016, AA149993, AA244075, AA101562, AW190875, AA101519, C17760, AW510529, BF825235, AA101520, AA404390, AW752957, T73746, BF133227, BF825377, AW996633, AI935684, BF353664, AI304788, AI093487, AI263270, T84017, BF871808, BF353770, R01692, AA641435, BF811982, BF871973, AI280307, BF771639, AA642887, BE006776, AI261914, AI928406, AI193265, BF764560, AI469580, AW999404, BF813934, AI632044, AA359412, AI002582, AV688621, AA626769, BE179555, BF727086, BE561354, AV703327, BE560144, AF111713, AF191495, AF207907, AK026665, AF154005, AF172398, A91699, A91701, AF111714, and AB017568.
HNTAP78	1262	899347	1 - 1712	15 - 1726	BG163314, BE612807, BE613258, AU138191, BG025354, BE274779, BF036129, BG121605, BE891215, AW963297, BG115149, BF980307, BF508712, BE410290, BE881430, BE281331, BE645843, BE775232, AI073520, BE541432, AI620111, BE866612, R70223, BE538395, AA188918, BF091838, AW970295, AI956078, AW003168, BE466532, AA779854, AW237147, AA362079, R67130, AW753744, BE781625, AI439258, AW512289, AA811396, BE047217, AA362557, AA534948,

					AI609159, AA300923, AI688602, AW439055, R57374, AU157509, AW970374, BE832827, BF799097, AW510711, AI625314, AI814840, AI242712, BE047205, AJ295745, AK002079, L31840, and AC008651.
HOGEN56	1263	899358	1 - 1060	15 - 1074	BF732391, BF115878, AW083349, BE857199, AA479495, AA479498, AA778607, AI858223, AI151232, BF514171, AW166236, AW328367, AI291374, AI567943, BE396202, AI560253, AI096849, BF732290, AW449943, BF515283, AA628224, N27280, AI191781, AA968918, AW006233, AA761741, R70251, AW405094, AW182126, AI245640, AI269136, AI738471, H00846, AA883484, AA286916, BF529836, AA018465, R38227, BF739796, BE905019, AW001378, H01229, R70296, AA831675, BE795173, AA962361, AA876230, BE882323, R38228, AW889978, and AJ250392.
HWLOU33	1264	899644	1 - 1944	15 - 1958	AL037051, AL040992, AL042909, AL039109, AL045353, AL039423, AL039128, AL045337, AL039386, AL038531, AL044407, AL038025, AL045341, AL037726, AL036973, AW235098, AL038837, AL039659, AL039074, AL039625, AL039108, AL039648, AL039678, AL039629, AL037615, AL037639, AL039410, AL039538, AL036238, AL036196, AL039564, AL036767, AL039566, AL036765, AL044530, AI142134, AL038983, AL039509, AL037727, AL079878, AL039156, AL037436, AL037295, AL037435, AL037027, AL037335, AL049018, AL040576, AL037443, AL037343, AL036167, AL038532, AL037323, AL040370, AL040529, AL037601, AL037049, AL036117, AL040052, AL044186, AL038822, AL041159, AL038838, AL039338, AL043814, AL043923, AL037742, AL039076, AL043845, AL040617, AL043868, AL041577, AL041459, AL044064, AL040294, AL041635, AL044037, AL042135, AL046994, AL040768, AL046850, AL045753, AL041752, AL045684, AL040625, AL041133, AL043570, AL043848, AL041374, AL043627, AL041523, AL041730, AL044074, AL041602, AL043492, AL040839, AL040510, AL043441, AL045671, AL046442, AL036158, AL039316, AL036132, AL046392, AL043677, AL043467, AL044258, AL040444, AL044272, AL040148, AL045920, AL044187, AL040458, AL046914, AL041238, AL045990, AL047170, AL040332, AL041142, AL044199, AL047219, AL044274, AL040745, AL040463, AL047064, AL040128, AL042096, AL040472, AL039077, AL040342, AL041168, AL040322, AL041186, AL039432, AL040119, AL044201, AL040285, AL040571, AL046327, AL044165, AL040091, AL045817, AL041131, AL040090, AL047012, AL047057, AL041292, AL041051, AL040168, AL041346, AL037341, AL041955, AL040414, AL043775, AL041096, AL039744, AL046330, AL041197, AL045989, AL037177, AL047036, AL040553, AL040253, AL040155, AL040082, AL039360, AL045857, AL040329, AL041358, AL043538, AL041163, AL041324, AL036725, AL041098, AL041277, AL040263, AL043941, AI906064, AL041278, AL040255, AL038043, AI634028, AI906040, AL040621, AL040149, AL040464, AL041227, AI905981, AL037021,

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HPMKP09	1265	899668	1 - 1004	15 - 1018	BG121332, AW237733, AI568189, AA554834, AI340966, AA758744, AW390332, AW015171, BF222170, AA782013, BE242256, AA364840, AV657850, and D14664.
HDPKJ19	1266	899677	1 - 550	15 - 564	H87671, BE734498, BE539520, N47067, AW389158, AW389155, BE547149, AW377529, AA135001, BF805523, BE715066, AW970915, R91931, AA713751, BF828645, AF029308, AC019187, AC010150, AC008040, AC016968, AC007883, AC004889, AC004534, Z95116, AL133448, AL031407, AC006261, AL049829, AC003111, AL117377, AC008417, AL035662, AL031390, and AC008649.
HOEJZ65	1267	900050	1 - 521	15 - 535	BG036858, BE872087, BE905034, BF966497, BF213548, AW163384, AV706875, BE884477, BG036980, BF528079, BG170147, BF981877, AV722208, AV751764, AI751062, AW630274, AL513966, BF793048, AV690719, BF344397, BF038330, AL533472, AV726612, AL532845, AL513902, BE958330, AL533387, AW959013, BE261396, BF030728, BE879170, AV751883, AA149499, W04203, AV750016, AV747947, BE258679, AW016720, AW161328, BE251722, AV653506, AV699051, AA442305, BF337713, AA173092, AI207774, AW167798, AA477898, AA007157, AI796873, AV723355, AW341263, BG166195, AI926867, W28608, BF382704, AV691018, BG036997, BF839826, BF836373, AV696666, AW378695, AA313262, AV714056, AW362041, AA143378, AV723224, BF478034, BE148068, BE075924, AL047951, BE145397, BG168281, AV686365, AV686702, T30402, BF832816, BF352834, AV747996, AV748224, AV749009, AW362012, BF541480, T35344, AW953849, T07918, BE671421, BF445217, BE147213, BF836421, BE148073, BF840305, AW392273, T31755, BF349964, AU122955, H62690, BF834084, D45302, Z78352, AW378690, AW842356, BE870162, U46272, BE006400, BE148024, AW379013, BE006401, BF352941, T05330, BF836391, BF830577, BE006396, BE147860, H74077, BG169120, D56480, AV660165, AV660182, AV660030, AV660134, BE669945, BE147995, BF349976, F11245, BE932272, BE819798, BF836424, BE819804, T35254, AW947200, AW947196, AW947208, N89154, BF088953, AW947206, T30699, BF887330, AW378990, BE142665, BE147862, BF836379, BE707676, N84431, BE877821, BG004815, AW368285, BF887332, Z42416, N88369, AW368304, AW368287, AI908027, BF126354, AV750470, T34830, AI908025, BF914067, BF907228, BE151380, BF366488, BF880046, AA657545, C16730, AA527818, AW753162, BF130432, AI189911, AA486795, BE006405, H01825, W20229, AV749365, AW378679, AW368372, BF699510, AA156847, AV755863, AW381025, AA341227, AI923660, BG249023, AV724880, BE082911, BF350355, BF247240, BF670673, BE083087, BF830578, T93979, BF836420, BF965287, BF832836, AL037578, AA282493, AI355255, BF184469, T31525,

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HHASY37	1268	900177	1 - 980	15 - 994	AL521504, AL518185, AL520428, AF039237, AL533563, AL524052, AL517048, BG169623, AL538440, AL535012, BE392830, BE730889, BE252619, AL526545, AW967000, BE535931, AW605595, BE255566, AU119098, AW815343, BE299275, AA323642, BE873358, BE385297, BE838832, BE383274, AA040646, BF311654, BE795140, BE246779, BE074591, BF344085, BF310013, BE246783, BF754907, AA287125, Z44618, BE388949, BE299103, AW631482, AW386990, R13486, BE907835, T35835, BG165009, Z42306, BG166003, AI750912, AA416805, BE875997, BE467394, BE467376, D31575, BF091946, AC004596, AY007092, and AK021759.
HBXBC08	1269	900230	1 - 2010	15 - 2024	BE277178, BF980634, BE732783, BE744869, BF205108, BE734231, BE902466, BG171519, BF205706, BE793662, BE537334, AA772073, BG035960, BF307828, BE408797, BE251754, BE386724, BE252692, BE881757, BE379030, BF794278, BG178169, BE813829, BE742898, AJ403113, BE909061, BE732299, BE298431, AW327370, BF366342, BF983678, BE734758, BF307853, AV733932, AV734233, BE540445, AA342017, R15335, BE908194, AL043038, AW249080, BF988458, BF856355, AA397954, BG107935, AK026991, and AL136295.
HBXCF11	1270	900775	1 - 3141	15 - 3155	AL538256, AL534957, AL535890, AL536148, AL514132, AL519113, AL537613, AI770054, AV716482, AI028115, AW026538, BG104906, BE881866, BE177946, BG259395, BE253859, BG035496, BE178256, AV708287, BE874653, AV707742, BE178053, AV706986, AW390188, BE884935, AW965125, AV654614, AV731316, BE880413, BE177955, AV704940, BE909390, BE176352, BE439642, AL519112, AW936230, AW579713, BE178452, BF967799, BF966788, AW605194, AA054470, BE894828, AI064769, BE178133, BE178134, BF967364, BG000320, AW364485, BG114793, BE178445, AW364504, BF305052, AW605199, AW390182, BF967036, AW370691, AW936207, BG249152, BF213607, W52428, AA706727, BF306111, AW071923, BF983403, AI955161, BF965762, BF924196, AA573354, AW965985, AW896597, BF326895, AW999142, AI929568, AI584005, AW896608, BF350029, AW956693, AA903139, AI796770, AW235655, AW474685, AI697832, AA855136, BE620553, AI753263, AA946958, AI268463, AI679424, AI623809, AI801030, AI925466, AI570025, AI978755, AI422868, AW088410, AI471488, BE467552, BF184423, AI819906, AI028055, AI080517, AI859506, AI167983, BG036758, AI268444, AI359790,

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HKIXQ06	1271	900956	1 - 575	15 - 589	AA450131, AW967962, BF242862, H91351, AW403790, BF438052, AA262026, BF213839, AI480214, W38567, AW605392, AF205633, and AC006205.
HUFDB55	1272	900993	1 - 2157	15 - 2171	AW844103, AW844747, AI732436, AW753854, AA579242, BF341001, BE550265, AI954628, AI763064, AA053424, AI493412, AW134526, AA534814, AI967966, AA053043, AI992267, AI342785, AW969968, AI304542, AW572433, AW844696, AI913775, AI864467, AI733752, AW849201, AW849629, AW852393, AW852392, AW852395, AW852426, AW852464, BE927029, AW852425, AW603439, AW852394, AW852463, BF756667, AW852468, AW852467, AW376406, AW852466, BF747168, BF747199, AL134524, AW938701, AW852427, BF747181, AW603411, AI142134, AL038983, AW970540, AL037727, AW969624, AW969911, AW970070, AW970105, AL039643, AW968190, AL041347, AL039432, AL037443, AL037343, AW970020, AW970069, AW969631, AL037335, AW969625, AW970101, AW969621, AL037436, AW969778, AW970107, AW970118, AW972212, AL037323, AL049018, AW970093, AL038838, AW968150, AL041238, AL047012, AW968207, AL044125, AL047170, AL040463, AW968204, AL047219, AL044162, AW970032, AW970079, AW972154, AL040193, AW969885, AL040621, AL043538, AL047064, AL043496, AL040464, AW968212, AW969632, AW969664, AW973393, AL041324, AW976515, AW970076, AW969653, AL045817, AL041098, AW970119, AW969623, AW969782, AL040119, AL037435, AL041133, AW979228, AW976511, AL044186, AL041096, AL038822, AL040625, AL038532, AL040322, AW970531, AL041163, AW971954, AW969848, AL038761, AL047057, AW969916, AW975876, AW968338, AL040617, AL040510, AL040075, AW974805, AL044037, AW969803, AW979064, AW973772, AW969626, AL040149, AL041358, AW975971, AW971964, AL041296, AW969936, AL043467, AW976510, AW970969, AL041346, AW972736, AW975938, AL041086, AW969961, AW973808, AW973380, AL045684, AW969934, AW969794, AW969648, AW979294, AW973780, AL041246, BE185215, AW968340, AW973127, AL041197, AW969634, AW975157, AL041752, AL040576, AW979090, AW972156, AL043923, AL043814, AL043677, AW973241, AW970535, AL041635, AL040839, AW973219, AL043845, AW971965, AL041233, AL040294, AW968196, AL045753, AW969926, AW969756, AL043492, AL041602, AW970074, AW975173, AW975162, AW975255, AW973781, AW973164, AL040553, AL046442, AW975106, AL044064, AW975981, AW979238, AL041459, AW969768, AL044074, AW969677, AL040472, AL041577, AW975692, AL040444, AL041292, AW975046, AL040052, AW975154, AL041730, AL041523, AL043627, AW970095, AL041277, AW970013, AL041159, AW969874, AW971984,

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HFKLY39	1273	901208	1 - 1878	15 - 1892	AL534231, AL532581, AL532760, BG254686, BF970832, BF971123, BF978854, BG104688, AV701187, AW814788, BG030686, BF700138, AV726823, BF692081, AW814838, AV706719, AW814744, BE906108, BF668244, BF792095, AV700348, BE565178, AW392336, BF245582, BF211573, AW369758, BE934654, AW609730,

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HUFAY01	1274	901287	1 - 1982	15 - 1996	AL518765, AL518764, BE740716, BE727421, BE901928, AI805720, BF035254, AI375187, BF973848, BF980889, AL522595, BG055142, BE889402, BG031833, BE790201, AI819851, AI740753, AI683950, AA733074, BE311621, BF683552, BE407271, BF224450, AL522594, AW885558, BF433514, BG059575, BF341341, BE856853, BF877859, BG150114, AI290688, BE467058, AI469346, AI247277, AI524822, BE551391, AW613187, AW290983, AA304833, AI097608, AI312775, AI042059, AA531503, AW629604, BE844029, BE302805, AI312779, AI633056, AA583309, AI284993, BE938564, AW380334, BF748600, AA533234, BF740458, BF062710, AI684618, AA604862, AA034045, BE150213, W88995, AI991473, BE062968, AI479280, AI433421, AW605985, AW605976, W89086, AW605971, BE881249, BG056761, BE880988, BF197438, AW605978, AI783763, F27867, AW605983, BF431527, BE300500, AI269336, AW732929, BE843923, BF847402, T98012, AW302358, AA770498, R11941, BF032382, AW207899, AW130747, AI078550, BF090281, AI826595, BE076400, AI453832, W00351, BE775286, AI280387, AA903189, T98091, AA302063, AI582432, BE165638, AW591805, BE302820, BF868920, AI624010, R37031, AW295319, AA432285, AW779775, AA371667, BG166892, AI364689, AI859212.

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HAHCK43	1275	901386	1 - 1766	15 - 1780	BE741108, BE562785, BF853420, BE222910, BG253535, BE393668, BF215586, AW083493, AW364814, BE902074, AA888116, AW440785, AA837808, AU150860, AI922963, AW665244, AW339933, AI335975, AU148870, AW008506, AI278245, BE903725, C04905, AW182620, AW664019, AA587046, AW888964, AI082044, AA293743, AA155590, AA937213, AA985577, BE677337, AW070770, AI307135.

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HETHC61	1276	901421	1 - 1363	15 - 1377	AW959307, AW510737, AW162943, BG149664, BF109891, AI590817, AI492171, AI168081, AA831769, BF513861, R25716, AA359492, BE711112, AW238299, R62460, AW379689, C02578, BF836799, BE048370, AW241754, AW243207, AI034221, AW998729, and AL355497.
HNSME80	1277	901436	1 - 2144	15 - 2158	AL519042, AL041512, AI467869, BE872575, BF691117, AI819953, BF590283, BF590356, BF216735, AI818938, BG169133, AU154066, AW952794, BF061587, BG253568, AU149303, BF665091, BF217445, AU153062, AI769146, BE856655, BF246345, AI346009, AW273046, AI818956, AI041737, AA704098, BF571609, AI305210, AI024481, BF109889, AI305206, AI754529, BG110714, AI379159, AA460602, AU125696, AA608730, AI333572, BF244360, AA461530, AI284854, N69958, AI942365, AA857186, AI347927, AA164468, AW339594, AA613573, AA669218, BF246880, AW368542, AA194165, BF448903, AV724660, AI282940, AI804448, AI375848, AA194166, AI474197, AA164469, AI039184, AV739028, AA356075, AI683316, BF569131, T10012, BE545239, BF218871, BF035458, AA236052, F08766, Z41800, T32159, T33888, AI802220, T05337, AA705349, AK024258, AB028961, U87791, AL137664, and AF087672.
H6EDK67	1278	901529	1 - 833	15 - 847	BE621805, AI740538, AI991063, BF968565, AW665241, AI816235, AA989369, AI816180, AW955914, BE880589, AI568003, BG058595, AI879047, AW337566, BF513795, AI815804, AI401701, BF680529, AA992003, AA887219, AA314893, BE790348, AI193891, AA991962, AI870871, AI129251, AA938974, AI937894, AI816312, BE620995, BE965457, AA417644, AA972057, AI816219, AA411565, AA984034, AI815497, AI493664, AA419548, AA410528, AA985561, BE327241, AI969199, AA234347, AA523589, AI201484, AW583860, AA738149, AW796566, AA639075, AA714943, AW796467, AA661984, BF378477, AW371214, AI373806, AV685470, D11909, AW796524, BF998677, AI698157, AA308942, AI220909, C21419, AI698146, AA165132, AA054834, AI420464, AA644345, BF809980, T81127, AI933854, AI015791, AW104613, AV750172, AI784278, BG259848, BF222330, AW796465, AA299888, BE084677, AI014584, AV721755, J05069, and AB022714.

HMSCY51	1279	901561	1 - 2232	15 - 2246	BE742141, AI147040, BB899372, BE798880, BE728450, BE898463, BG036055, BG116527, BF035903, BE745866, BF981569, AI300527, BF983770, BG112873, BE513205, BE312862, AW954404, BE618141, BE395723, BE873567, BG178054, BG028619, BF984383, BE793517, BG112301, AA587377, AL526009, BF348244, BF037981, BG110999, BG054830, AW262596, BG026904, AI749037, BF968971, BE393230, BF344098, BF036816, BF063379, BF036180, AW249503, BG256893, BF037474, BF982694, BG248357, BE795630, BF805099, BE293247, BG231995, BE312166, AI754474, BE090335, BE257263, AL526063, AA833883, AI680852, AW957489, AI150184, BE263578, BE931598, AI928189, AA740785, AA451894, AI963804, AA745848, BG117900, AA037128, BG024075, AW615399, AA922673, AA480894, AW182778, BE719811, AI422459, AI362272, BE899052, AA480952, AV722562, AW250268, BE314685, BE303058, BG110401, BE836085, AA602363, AI356068, N36889, BE178980, BF439421, AA037508, AI832951, AW118884, BG056311, AW084887, AW401878, BF917245, AW614905, W70034, AA629610, AA635280, AW368704, AA452082, AI799103, H82753, AA831343, AA045097, AI885257, AW770259, BF940547, BE301334, AI369408, AI266141, AW340229, BE513415, AA047171, BF112113, AA994830, BE143228, AA687184, AA282268, AA838838, AI031734, AI262401, BF759403, BE674986, AI028014, N69029, BF854344, BE208015, AA522833, AI798549, AI360652, AI369135, AW514771, BE539789, AI400299, R66211, AW024945, AI982743, AI129681, AA780100, AA026868, T63572, H59917, AI380625, N24421, AA862874, AA620584, BG023931, AA114004, AA568994, BE304750, AA872075, H84444, H42030, T63497, BE933489, BE810852, AA114064, AA610253, AI865993, AI027712, BE348870, AI363863, AA622188, AA019035, AI281344, AA581941, AI285021, AI954518, AW375991, AI393720, AA887725, AI492724, AA297718, AW407782, AI350152, H99631, AA302917, Z44568, AI242981, AA024859, BG023781, AA600960, R18087, AA836524, BF894564, AA026867, AI217817, AW264702, AA031944, AI092794, AA024942, AI266633, AI961326, Z41705, AI521014, AA298499, H42029, AI720237, BE673180, N46163, U46275, AA530996, AA745626, AI079633, AI830714, AA282269, AA714572, AA297928, BF854346, BE873865, BF351017, AA057042, AA045009, AA039801, H28692, AI214663, AA714571, AA297503, R42980, BF891017, AI289504, AA810998, AW998750, BF374144, AW847201, AA915959, BF830907, AW407164, AA032064, H41001, AA782807, AI701301, AA947311, H59918, H83630, AA814257, AI285355, BE164318, AA251017, BE872218, BF062919, AW607356, H84443, AW797132, AW797252, T24665, AW751024, AX035212, AL137440, AK024622, AF002672, AL137555, AL049314, X65873, AL133049, AF090900, AK026631, AF106657, AK024524, AF183393, AK024992, AL137530, X66862, A27171, AL133072, AF116631, AF069506, AF218023,

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HTXMM27	1280	901592	1 - 933	15 - 947	BG107935, AA421156, AW263208, AW778811, AI860213, AW438684, BG178169, AA427665, AW467358, BG167807, BE909061, AA397954, AV740176, AW675564, AI348480, AW004828, AI129055, AW070768, AW068454, R42232, AW769032, AI800035, AW081957, AI695650, AI520752, AV734233, AI206299, AA935849, AA204944, AW769340, AV733932, AW248645, AW263189, AI656757, AW769555, AA342016, AA035137, AA576268, AA293754, AA361461, AW573223, AW135932, BF737443, BE742898, AA330688, AA503645, AA342017, AI917771, AI421042, AW007750, BG151170, AK026991, and AL136295.

HTXPO61	1281	901690	1 - 1157	15 - 1171	BF035730, BF313196, BF701446, BE869580, AW794763, BE782604, AL046382, BF982786, BE958004, BE903867, AA009408, H00384, BF976631, AL526395, R35100, BE542872, R72960, T77525, AA318121, N57136, AA368236, R31846, BF771825, R13455, H27802, AW062921, AA512981, AW964791, AW367721, AA340393, BF997760, AA053914, BG025980, R53894, AA018884, R85166, BF927366, H80784, AA018121, AA016154, AR079030, AF069307, AF081571, AL096737, AF116241, and AF080067.
HLWAM62	1282	902115	1 - 1293	15 - 1307	AL518805, AL518333, AL518968, AL535793, AL530587, AL515587, AL514800, AL515494, AL534633, AL532669, AL518527, BF981426, BF526011, BG259839, BF337531, BG250594, AL518080, BF530993, BG259340, BF343800, BF337154, BF347094, BF793276, BF346036, BE892843, BF527646, BF337868, BG025108, BF348083, BG034329, BE261745, BF526625, BF344474, BF339116, BE262889, BG033117, BF527712, BE893935, BF033885, AL518786, BG120349, BF345570, BE313071, BF341785, BF304377, BE782496, BE260138, BE312363, BE779190, BF724156, BG026556, BE909963, BF342586, BE618263, BF316097, AA291359, AI792419, BF950119, BF087469, AV722651, W39535, BF033260, AL036384, BF949074, AA682331, M78898, AA306383, BF838150, BF906852, BE314662, AW403222, H23306, H53246, W39534, AW161481, BE842849, BF840201, BF949007, T33857, AW900165, R35030, W52623, BF156037, AW295067, AA351621, T95800, N36204, AA349842, R66500, AA351491, AA158690, AA128062, AL518785, BF361858, BE839984, AW938099, BE247341, BG112672, BF724143, BG030156, R81530, W45233, BF337835, AV748402, AA300719, AV746692, AA318187, BF311257, AL518332, BF760391, AL518526, BF949306, BE835080, AA351343, AW603824, AL515586, T19717, Z41855, T32175, BF081178, AA339335, AW378580, BE171248, AW239398, AL518804, BF949302, R45827, BF927559, BF920837, AA332614, AA354300, BE763425, BF927560, BE247452, BF526148, AF272043, AF272044, and AB030199.
HFXLK46	1283	902129	1 - 1233	15 - 1247	T02924, A38246, A11524, and AR029497.
HBMXK78	1284	902144	1 - 1470	15 - 1484	AV714287, AI912618, BE222303, BE673348, AW020096, AI632584, AI690052, AW675741, AV707783, AV706183, AV728270, AV702427, AV706724, AV726505, AV725927, AI263803, AV702637, AV727932, AV706746, AV701611, AV659189, AV704974, AV709407, AV725369, AV702798, AV732149, AV730781, AV723449, AV730288, AV751921, AV753374, AV705020, AV704916, AI003550, AV658362, AV752043, AV731744, AV731313, AV704592, AV728777, AV662191, AV701320, AV731708, AV726067, AV751555, AV730547, AW023393, AV726674, AV755874, AV757088, AV731915, N51299, AV731977, AV731043, AV732002, AV731694, AV710534, AV746276, AV761270, AV714368, AV732353, AV728872, AV730165, AV730711, AV724987, AV732155, AV731275, AV729983, AV731759, AV732653,

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					A60985, A22413, AR027318, A43189, A84774, AR080280, A43188, AX003194, A60990, A64973, AR069364, A60987, AX026824, AX026823, I63560, AR009152, AR009151, I63561, I63563, AR062871, AX006825, AX006826, AX042372, AR091716, AX006822, E14304, AR002333, I08776, A81878, A38214, AR069374, I25027, AR069426, AR069375, I56772, I95540, A98767, I26929, AX006816, I44515, I26928, I26930, AX001082, I26927, I44516, I15353, A93963, A93964, E16678, AR093385, I25041, AX027815, A95096, A95106, A95105, AR093392, A92133, I07249, AX006030, AR068508, AR068510, AR068509, A63954, AR091571, AR085090, I58322, I58323, AR003585, A91750, A29109, A32111, A20700, AR035975, AR035974, AR035977, AR035976, AR035978, I08051, I44681, A58521, AR038855, A91754, AX026821, AR031374, AR031375, AX001325, AX001326, AX001323, AX001324, AR020969, AX028305, I18895, AX009487, A85395, A85476, AX001322, AJ244004, AJ244005, AX047064, AJ244003, AR008429, AR038762, A49700, I63120, A98420, A98423, A98432, A98436, A98417, A98427, Y16359, AR085082, AR085089, AR085091, D78345, AR085079, AR085083, X83865, E12584, AJ244007, A93016, A18053, M28262, AX011024, AX003207, I15717, A92666, I15718, A92668, A92667, B03627, AR096545, A77094, A77095, I49890, I48927, A60212, A60209, A60210, A60211, AR069650, A92665, A02712, AR080470, I84553, AR077142, AX033488, AX033489, AX033490, A95051, AR095492, I84554, A18050, R32249, R32298, R78842, R79332, R81302, H00999, H01744, H90054, AA062997, AA278260, AA487188, AA487248, AA487341, AA487363, AI051450, and AI263746.
HE8TF48	1285	902236	1 - 2914	15 - 2928	AL526833, AU123880, AU137327, BF983995, AI796539, AW964758, AW749061, BF691721, BF032001, AI301961, BF478190, AW027599, BG105255, AW964759, BE467411, AW665584, AW044582, AW235667, AI828213, AA075557, AI142288, AA554366, AA194931, AI453084, AI638321, AW205060, AW964763, BG165531, BF977077, AI377198, AI979164, BE857620, AI216072, AA449002, AA194932, AU157132, BE940580, D80402, BE541946, AI216074, W93936, AW964764, AA524862, N63060, AW612652, AA962391, AA195588, D80401, AA180173, AA075562, AI693460, W93935, AI539364, AI208013, AA243504, AA180147, AI439529, AI358753, AA862884, BF241341, N46536, AA885417, AW137240, AV750595, AI758401, AA243357, BF222352, AA450312, BF197943, AI806439, AA983410, BF675430, AA339971, AI682244, BE782800, AI765882, AW102693, T89241, AA213530, AW085973, H88454, AA249662, AA422037, H88386, AW661910, AI365170, AW589679, AA862164, AA093684, D81650, AA884124, AV730964, AV731294, AA194884, AA431104, AA757061, BE670876, AW519221, BF814152, AA249563, AK000737, AL117531, and AK001992.
HMUAL57	1286	902291	1 - 1410	15 - 1424	AI924533, BE047851, AI863101, AW088579, AW009943, AI659089, AA478318, AI821674, AL119457, AW089272, AL042544, AL119399, AL042382, BG032704,

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HWCAD85	1287	902684	1 - 1531	15 - 1545	BE256927, BE257400, BE255129, AW975981, AW975941, AW973821, AW973789, AW969694, AW979076, AW975596, AW971953, AW975626, AW976024, AW973397, AW973819, AW979090, AW979295, AW973254, AW975217, AW969698, AW969988, AW975952, AW972879, AW973762, AW969921, AW970915, AW979204, AW975592, AW974109, AW970896, AW979037, AW972783, AW971975, AW975650, AW975971, AW972871, AW975266, AW975049, AW972440, AW968338, AW979093, AW969772, AW970927, AW973777, AW979269, AW968148, AW972769, AW972799, AW974932,

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HLWCJ37	1288	902841	1 - 1755	15 - 1769	BF056859, AI950360, BG236479, AA236217, AI361031, AA418443, BF108683, BF591089, AI128844, BF475316, AA234138, BF594184, BE670221, AA757278, AI342632, AI361934, AW293218, AI765582, AI703156, AI128275, AI949635, AA056658, BF224126, AW057598, AI361461, AA056410, AI830753, AA172040, AI146443, AI767963, N31643, BF224128, N27174, AI829376, AI188960, AI949283, AI290703, AI335683, AI681942, AA172194, BF447701, N39919, AA557621, AI681350, N57105, AA128162, N31647, AW237789, AI033224, BF589027, AW004907, AI735524, AW515103, AW305109, N30714, R62698, BG153411, R76068, AA125975, BF115111, AW105367, AI000265, AI770139, R33815, AW853796, AI474441, AA723866, R08355, R63659, R33814, AV713103, R75891, H93692, N57098, AA703473, AW016556, AI700946, N41328, AA418393, R08399, AW510566, AI767420, BG230833, AL119457, AW877209, AL119399, AL119324, AL042544, AL119443, AW392670, AW804686, Z99396, BE695785, AW861944, AW604723, AL119497, AL134902, AW858526,

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HUFDC04	1289	903101	1 - 1635	15 - 1649	AL519891, AL524462, AL528554, AL522938, AL522937, AL528553, AL529656, BE798758, BF983928, BG257824, BG121754, BE513077, BE904608, BE891859, BE250848, BE549032, BE893592, BE785735, BE384544, AL524441, AW958027, BE882183, AL525221, BE512679, AI199103, AA604404, AI735406, BF109298, AA393099, AA191001, AA205313, BE867661, AW025239, BF445953, AI457327, AI421414, N52379, AI278017, AI720720, AI829849, AW004793, BE220525, N20562, AI033280, AI092515, AW299827, AA595242, N38928, AA885902, N21453, AI202803, AA236451, AI161131, AA568605, AI017854, AI937534, H48327, AI359411, H53775, AI080378, R61207, BE702135, AW079295, AA191126, AA664829, AA412120, AA296938, AA298748, BF743417, AI341364, BF742340, AV646502, BF743749, AI128992, N46499, AA234485, H69040, H48236, BF800105, BF743467, AV646612, BF743472, AA456724, AA931424, H75686, H75378, BE767348, BE767350, R64510, H60941, R61206, AL525220, BF762117, AI928767, AI254208, H60854, R26385, AI678568, AA298572, AA297167, AI206697, AA296840, AA917535, AV744530, BF700808, BF087607, AV736619, R65602, AA310892, H53825, H92760, BF742338, H75372, BF953770, BE073136, N72786, BF754905, BF696176, AI978889, AW001569, BG110519, BF825964, and AV646784.
HHEXO15	1290	903309	1 - 892	15 - 906	BF793677, BG030159, BF968107, BF971167, BG034696, BG031029, BE256879, AL535052, BG113339, BG168461, BG166970, BF029990, AV710467, BG163707, BF184956, BE878076, BF571367, BF683278, BF677752, BG028333, BF103812, AA479559, AW301038, AW081643, BG112033, BF183860, BF541112, AI028278, BE879546, BF213193, AW130434, BF030176, BF665269, BF132139, BF700007, AW131303, AW131295, AI955122, AI422293, BF382241, BF130738, AW083308, AI672869, BE909361, BF381820, BE744389, BE855465, BE546966, BF540976, BF032082, BF977978, AI878995, AW327347, BF977675, AI281194, AA633512, AI351044, AI097413, AA477638, BE788872, AI560983, AA813514, AV747127,

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HE8NI05	1291	903697	1 - 752	15 - 766	AL134851, AW966053, AW975618, AW978634, AV723927, AV719188, AV699447, AV699550, D57483, AW978661, D80253, D51423, AW949641, D81030, D59859, AW973307, AW966534, AW959202, AW975621, D80166, AW966531, D59619, D80210, D80240, AW949653, D51799, AW960553, AW966041, AV719822, AV718489, AV718692, AV720211, AV699927, D80227, D58283, AV719324, AW949656, D80212, AW949642, AV719557, AV720731, AV722801, AW966013, D59889, D80219, D80188, D80195, AW959799, AW975605, AW966054, AV718440, AV719783, AV720028, D80391, D59610, AV720203, AW966050, D80043, AV720464, D80269, AW966062, AW959597, AW959628, AW965177, AW959570, AV718800, AW949645, AV718931, AV718844, AW949657, AV718770, AV724520, D80366, AW949633, D80196, AW965158, AV718633, AW978648, AW964488, AV720791, D59927, AW949631, AW949643, AW949618, AW949655, D80038, AW949629, AW960465, D80193, AW959582, D80241, D80022, AV719468, D80024, D59502, AV721386, D59275,

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H2CBP53	1292	903718	1 - 1613	15 - 1627	AL515603, AL517389, AL532802, BE274953, AL519414, BE733941, BE746750, AW963023, BG107046, BE910239, BG170496, BF981175, BE884855, BE896793, BF983691, BF982001, BE892987, AL525500, AW968941, BG106044, BE262424,

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HDPPP18	1293	903850	1 - 1504	15 - 1518	AL529496, AV681504, AV681500, AV681462, AV681497, AV645385, AV681529, AV645317, AV645392, AV681495, AV681465, AV681507, AV681526, AV681512, AV645393, AV645390, AV645336, AV681492, AV681509, AV681525, AV681505, AV681471, AV681502, AV681486, AV681483, AV681464, AV681506, AV681523, AV681519, AV681487, BF843303, AV645358, AV681513, AW971745, AV681475, AV645383, AV645401, AV645332, AV681510, AV645389, AV645377, AV645379, AV645369, AV645321, AV681527, AV681501, AV645400, AV645404, AV645353, AV681458, AV645380, AV645334, AV681528, AV681514, AV681474, AV645339, AV681477, AV681491, AV681472, AW162917, AV681488, AI271850, BE614237, AV681461, BE613349, BE612945, BE622828, BE613070, BE614307, BE613136, BE622931, BE621911, BE614230, BE622925, BE618811, BE622868, AV645350, BE620742, BF881526, BE614451, BE245275, BF813104, AV645344, AV681531, BE620756, AV681468, BF894558, BF895385, Z99396, AW604723, AW392670, AW858526, AW858525, U46347, AW804686, AW861889, AW858455, AW363220, AL119484, BE695785, AW861944, AL119457, AW604726, AW384394, AL119497, AL119396, AL119319, AL119439, AL119324, U46351, U46350, AL119391, BE705903,

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HSLFD86	1294	903930	1 - 1591	15 - 1605	
HTLDD85	1295	904049	1 - 1067	15 - 1081	AA778552, AI201364, AI150012, AA876180, AI223025, AW663435, AW304049, AW663514, AA978197, AI223459, T19204, AA903410, AA382504, BF377251, BF376440, BF377259, T36107, AF012359, AA864517, BF377279, T36109, AI352610, BF377252, BF377278, AA868778, AW102794, AW058243, AL513723, AL514015, AI921248, AL513907, F36855, BF792781, AI978703, AI538885, AL118781, AI811603, AW131994, AV736808, AA190341, AI250852, AW827206, AI863466, AI890907, AI049669, AL514867, AI538850, AI677797, AI345688, AL039783, BE966927, BE011880, AI241744, AI571699, AI560099, AW078650, AI690946, AI950100,

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HDTIZ68	1296	904058	1 - 1104	15 - 1118	AV710643, AA682496, AI749928, AV712599, AI871491, AA166695, AA906714, BE972339, AV712475, R16882, T87299, D79690, AV741119, BF875951, AF150302, AV712496, BE241489, R16934, AV653767, AF186114, A79054, AF134715, AF132600, AF116456, AX044406, AF136293, AX047489, AF119383, A79060, A79061, and A79062.
HDAAV92	1297	904116	1 - 734	15 - 748	BG257195, BE249979, BE531338, BE293689, BE293347, AA465494, AA076535, BE304626, BE513219, AA149704, AA569010, AK024932, AB033899, AK000339, AB049761, AB012933, AB033901, AB033900, AB033902, AB033904, and AB033903.
HDPGH33	1298	904204	1 - 2430	15 - 2444	AU121983, AU142011, AU140553, BF310789, BE298155, AA780275, BF308182, BF305747, BF589646, AA524472, BE814909, AI796214, AI800089, AI620874, AW119178, BF445851, AW292287, BE836137, AU147700, AI493093, AI521627, BF055031, AI376017, AA759333, AW271577, AA644380, AW139649, AA649884, AA448215, AW206907, AA912175, BF995517, BF995586, AA478455, AI493371, AW296774, AA514321, BF995565, AV752143, AA995890, Z44658, AI269124, AV752672, AI826250, AI394047, AI380014, AI800874, BF063946, AI571955, AA448357, AA865884, H95104, AA365259, BF829930, AI640852, BF965350, AV752590, Z40511,

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HHEPR52	1299	904360	1 - 555	15 - 569		AL516746, BF980691, BE740193, BE744654, BF530048, BE273312, AL047004, AW163066, BE970233, BE545415, AL521080, BE797285, AL528644, AL514308, AL520688, BE782946, BF699356, BE797528, BE781512, BE314042, BE866857, BF345868, AL515384, BE744392, BE783530, BF031113, BE876119, BE874134, BE904479, BE782888, BE873370, AI751459, BE880453, BE740753, BE256558, BE265452, BE616974, BE251085, BF132232, BE872300, BF314227, AA401153, BE871357, BG118586, W32784, BG121266, AL530793, BG179458, BF213345, BE547872, BE787715, AV736451, BF035908, AA477024, AA074562, AW965784, H23339, BE746413, BE019701, BE741074, BE019857, BE936508, BF090799, BF930574, AA159385, AV743828, BF090647, Z45486, BF090684, T78247, AA121947, F06907, AA687532, N88433, T07995, BF530447, BE779799, R35014, BF090562, W17118, AA297409, BF693865, H47444, R84488, AA297404, AA297477, F08111, AA297839, BE873574, AA404441, AA824395, R47823, T08524, BF968524, T19986, AA247384, T19987, BE868293, AA214707, BE275946, BE407239, BE382761, BE744287, BE514572, AW027007, BF737283, AW027018, AI034167, BE747282, BE744886, BF738694, AA985583, AA733158, AA770186, AA661638, AI307230, AI076446, AA121948, BF092043, AW859700, BE796353, AW849521, AF151020, AX013063, and Z65735.
HSYDY88	1300	904381	1 - 2103	15 - 2117		BE799745, AW149659, BF034086, BE262936, BF317221, BF528820, AI435112, BF347942, BF984178, BG056462, BF196843, AL529624, AA779709, AW352357, AW167499, BE328548, AI982761, AI246702, AI271662, AL518866, AI982751, AI538705, AL536118, BE734663, BE733072, W07076, AL537723, BF569646, BE908156, BE906311, BE925156, BF764087, BE314199, AI689641, BF530233, BF683470, BF315602, BE313287, AW965361, BF968011, AL536119, AA232168, AI032138, AI183690, BE312408, AA809550, AA332510, AA447471, BE260710, BG164707, AW136277, AA298564, BF196591, AW665899, N77910, D55112, AA564806, AW631124, BF923719, BE018730, AI142536, BE393867, AA341609, D54101, T80568, AA199743, AA852419, BG250851, BF311148, D53384, AV722133, BG032159, T05461, AW138906, BG059892, AA852418, BF569986, AA355036, AA024888, AI133670, BG117992, BF527898, BG117812, AI174232, AI205304, AA533322, AA486937, AW071935, AW136268, W26633, D53747, AA844525, BF981945, W67857, AI082447, AI290911, H08108, AI131328, AW839764, AI091646, AW117296, T03902, BG056888, AW168872, T31719, AI741489, AW068986, AI467910, AA730875, AA233541, AI282445, C15651, D52660, AI682685, AI174443, AI432175, AI420648, AW839827, W25885, BF684204, AA599916, BF525584, AI288692, BE466948, AA243035, AI690048, AA243034, AA779042, AA853744, AI038647, AA486941, AA232504, AA486765,

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HHFCW31	1301	904399	1 - 1766	15 - 1780	AL528146, AL532850, AL528147, AI620217, BF528248, BF982162, AI056665, AW964795, AW973144, AI744518, AI038199, BF346739, AA236476, AI368718, AA747220, AI888960, AA534256, N47941, AA234584, BF371928, H19150, AI468582, BF371877, AI360711, BF445507, AI682413, N46864, R52959, H05869, AA297549, T27100, AI557353, AA736703, H05762, N49148, T27101, AA535462, Z45279, Z40989, AA579494, BE855666, R11739, AA358738, AI474169, R41378, AR052523, AF179274, AL157430, AB017270, AB004064, AR052522, AB041565, and AF264150.
HEOPR46	1302	904471	1 - 2680	15 - 2694	AW206491, BE243223, AI138727, BF057784, AW402064, AI280951, AI281357, AI249918, AA806582, AA936836, AI355086, AI650638, AA835742, AA279348, AW139813, AI088225, AA910667, F34182, BF001154, AA338603, AA338682, BF765083, AW861944, AW604723, AW804686, AW392670, BE695785, AW858526, Z99396, AW858525, BE705903, BE705906, BF868687, AW577135, AW372827, AW384394, AW861889, AW858455, AW877209, BF868697, BF868684, BE705905, AW363220, AL119457, AL119497, AL119355, AL119324, AW604726, AL119319, AL119483, U46351, AL119443, AW861954, AL119484, AL119363, AL119391, BE705904, AL119522, U46341, AL119341, U46349, AL119335, AL119396, AW971745, AI142131, AL119496, AL119418, AL042984, U46350, U46347, AL119444, AL037205, AL119439, U46346, AL042614, AL119401, AL134538, AL043033, AL042965, AL042975, AL134902, BF868696, AL119399, U46345, AL134525, AL134536, AL042450, AL043029, AW969885, AL042551, AW979204, AL042433, AL043019, AR060234, AX046357, AR066494, A81671, AJ279014, AR054110, AJ251859, AX030435, AB026436, and AR069079.
HDPIF47	1303	904473	1 - 2218	15 - 2232	AL513582, AU137710, AL513581, BE879926, BE875907, BF968799, BF791555, BF792958, BE876251, AW959968, BF792810, BE827843, BF968555, AI949941, BE876162, AU136532, AI765763, AW382167, BF692458, BG179488, AU122835, BE892299, AV699640, BF106234, AW382174, AV713629, AA449500, BF212019, BF692025, AW583040, AW382170, AW902068, AA878385, AA704776, BF979062, AI768711, AI918137, BF215357, BF570762, AW235520, AI199832, AI367820, AI074542, AA243341, AA071031, AI308913, BE150978, AW609396, AA604828, AI304674, AA831297, BE151243, AI290204, BE614989, AW391610, BE150919, AW389522, AU155999, BE150848, BE150932, AI086256, AA554171, AI285140, AU157281, AW379916, AW389518, AI361484, BE150880, AA285176, AA679730, AA287652, BF766698, AI028778, AI342266, AI332795, BF572848, BE501465, AA564884, AW609661, AA497006, BF432681, BF438907, AA496929, AI742352, AA824372, AA427806, AW582335, AA286805, AA809400, AA101705, H50009, BE150881, R59881,

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HKAIP13	1304	904639	1 - 2372	15 - 2386	AW959618, AL528457, BE857709, AL528430, AI806250, BF126180, AA455382, AI084580, AW368035, AL529481, AA005065, AI088155, AI566044, W92235, AA706063, BE328495, W92236, AA299662, AA004847, BE149252, H56718, T77776, AA002009, AA227236, AI922495, AA722941, AA456022, AA299663, AA001788, AW630463, H56641, AW904581, AV733999, AW971745, AL119457, AW392670, Z99396, AW804686, AL119319, AW861944, BE695785, AW604723, AW858526, AW858525, AL119355, AL119324, AL119497, AW877209, U46350, U46351, AL119363, U46349, BE705903, BE705906, AL119391, AW577135, AW372827, AL119483, AW384394, AW861889, AL119341, AW858455, AW363220, U46347, BF868687, AL119484, AL119443, U46341, AL119444, BF868697, U46346, AW604726, AL119439, BF868684, BE705905, AL119522, AI142134, AL119396, AL119335, AL043033, AL037205, AL119401, AL134538, AL134542, AL134528, AL134902, AL134531, AL134533, AL119418, BE705904, AL119399, AL042984, AL119496, AI142132, AL134525, AL134536, AW861954, U46345, AL119464, AL042450, AL042614, AL043029, AL042544, AL043011, AL043019, AL042542, AL042965, AL042975, AL043003, AL042551, AL132826, AB040902, AF169677, U42975, AB026436, AR066494, AJ251859, AX030435, AR060234, AR054110, A81671, AX046357, AJ279014, AR080280, and AR069079.
HLWEP76	1305	904673	1 - 2152	15 - 2166	AL514028, AL514027, BF309286, BE394233, AI937145, BF341063, BE090095, BF996163, AW007832, BF056466, AW300812, BF995041, BF750858, BE855995, BF341846, BF516522, AI982559, BF057637, BF750864, BF446278, AW664488, AL042399, AI026694, BF062178, N70144, AL042400, BF939187, AI189816, AA325825, AI125510, AI824290, BF229962, AI560393, AI206451, AI203493, BF062533, AW196328, N62429, T48622, BE856501, BF091634, BF091588, T35041, AI024408, BF431830, AI204132, BF991680, Z39476, AL537669, AW138527, BF920850, R33737, AA367854, T40614, AI198470, R78066, T35073, AI968937, T19189, AI654947, T53308, AW241489,

						Z43405, R77096, R62691, T19258, T53584, AW138553, AI468224, R78103, AI887002, AA336184, BE327016, AI589930, R76920, R23638, BG015036, AA774524, T48621, BG003031, R77732, AI452920, T53583, T39478, BF752954, BG013571, N98321, BG008889, R33625, BG004892, BG008197, T53307, AW059861, BF369604, BF878013, AI024102, AA338469, D45642, AI864438, BF818770, BG015443, and BE930306.
HTLIT05	1306	904861	1 - 1253	15 - 1267		BE745491, AI521447, BF982675, BG257755, N24987, Z42066, AW856800, T07905, and AC009475.
HPTZB93	1307	904877	1 - 1084	15 - 1098		BE550131, BE669741, AI279486, AW206040, AW138281, BE503536, AI817720, BF111080, AW205987, BE220179, AW206016, BE550053, BE673676, BE674121, AI694554, AA862263, BF223526, BF111158, AI860959, BF432864, BE042918, AI298729, BE327458, BE670698, BE674475, AI299747, AI216051, BE219919, AW340960, AI703067, BE504354, AI885693, BE218553, AW341220, AI681397, BE550043, BE219182, AI802146, BE220008, BE671475, BE218558, AI066735, AI298540, BE221386, AI630777, BE219603, AI279331, BE551086, BF108563, AI912139, BE503797, AI634502, AI127856, AI268259, AI796940, AI129532, AI299414, AI692842, AA923300, AW140104, AW665683, BF432977, AW137441, AW207254, BF433893, AI216530, AI914342, AI268955, AI459037, AW136174, BE327378, AW593075, BG055474, AI299132, BE465162, AA938376, BF510144, AI912208, AI693815, AI301061, BE221081, BE674621, AI002211, BE467016, AI299900, AW592285, BF433695, AW614715, AI298698, AI298009, AI702631, AI871768, AI810454, BE468203, AI689870, AW016202, AI458645, AI222004, AI689871, AW102711, AI702711, AI689859, AI804311, BE467560, AI732920, AI732919, BE045630, BE504320, AA995350, BE674465, N68345, AI351290, AA962534, AA825171, AI476744, AA974790, AA878309, BF111046, AA934499, AA528135, AI702851, AW024083, N94016, AI187311, BE645921, AW003096, AI670694, AI223259, BE221508, AW003320, AW139377, AW470300, AA916697, BF509919, AI791238, BE504086, BF110037, D50979, D59859, D80022, AW966053, D59787, D80253, D80024, D80391, AV699447, AW978634, D57483, D59275, D80196, D80366, AW975618, D51423, AW978661, AV718489, D81030, D59889, AW966531, AW966534, AV718692, AW973307, AW959628, AW960553, D80166, D58283, D59619, D80210, D51799, D50995, D80240, AV719822, AV719557, AV719324, AV722801, AV720211, D80195, AV720731, AW959202, AV723927, AW949629, D80188, AW949656, D80212, AW949642, D80043, AW975621, AW959570, D80219, AV718440, AV720028, D80164, AV699550, AW966054, AV720203, AV719188, D80227, AW966062, AV719783, AV718800, AW949645, AV718844, AV720464, AV718770, AW949657, AW965177, AV724520, AW949654, AV699927, AW949618, AW949655, AW966013, AW966041, AW959799, D59927, AV720791, D80269, D80038, AW949631, AW949643, AW959597, AW959582,

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HWLAJ33	1308	904911	1 - 1264	15 - 1278	AV714629, AV712849, AV655679, W37646, BE068228, AV713569, AI829939, AV712446, BE068227, AI188478, N42191, AV717356, BE930088, BE930112, AV711812, AV710658, AV733194, AA651825, R95749, BE930104, N74604, W37382, BF436405, AI672667, AI344390, AA845191, BF986915, AA831436, AA948467, AA835036, BG231639, AI189929, AW974584, R11180, T82875, AW191839, AI002523, R11179, AA704742, AA287646, BE698342, BE698353, AI300829, AW196619, BF086200, BE930116, BE245236, T62699, R95793, AW191840, T62849, T90287, AA938191, AW089814, AA988042, AA999818, AA886287, BE245206, AW341475, R94937, AL042114, AV715293, BE702411, BE702417, AW904277, AW904273, AW904276, AW904300, AW452299, BE702415, AA502473, AA480612, AW877209, AW392670, AL119457, AW857101, AW804686, AW578857, AW861254, AV703471, AW604723, AW861944, BE695785, AW858526, AL119324, AW858525, AW372827, AL119391, U46341, AW363220, BF868687, BE705903, AL119319, BE705906, BF868684, AW577135, AW384394, AW861889, BE705905, AW858455, Z99396, AL134531, AL119363, AL119484, BF868697, AL119497, AL042973, BE705904, AL119399, AW604726, AL119355, AW861954, AL119522, AL119341, U46351, AL042614, AL119396, AL119483, AL119443, AL119444, AL042544, U46349,

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HAGFD47	1309	904977	1 - 1423	15 - 1437	AL521371, AL521372, AL516032, BF337502, BF791366, BG249151, BG258660, BE871082, BE384522, BG113640, BG260630, BE277846, BE531141, AV731587, BF346426, BE973743, BE389571, BF667795, BE563906, AI735261, AI808277, BF211360, BF691310, AW674769, BF743166, AI368797, AA583057, AI828551, BE567499, AA807741, BF965165, AI026716, AW853901, BE616237, AI088857, AW439214, AW853890, N73457, AI142511, N34764, W02860, AA633495, AA594963, AA862351, BF790198, AI469848, AI356184, N27248, N44490, AI125040, AW518053, H98681, AI306645, AV729211, AA748024, AW675383, AI280832, AA830528, BF691333, AI707840, BF239125, AA916426, AI285008, AW951663, AW958349, AV724056, BF743169, BF572289, BF664548, AA459511, BE615442, T87237, H04537, T71560, H29267, H94779, BE614864, BE855394, T71330, H09795, AW078897, AI261966, AA507967, BF541751, AA613581, H09880, T74091, H57434, BE763380, H29351, AI783537, BF239991, T79791, T82010, T71482, D60812, AV711819, H04458, T97835, AA483615, BE093345, AI685127, AA307295, F10230, AW068971, F12612, AI471017, C00631, AI523786, BE833176, AI587003, AW051263, AA588437, AW364142, T10196, AA379077, R41344, T79360, AA156281, BE077173, T99340, R18496, AL516031, AA156393, T10197, AW168908, AA215785, AA452714, AA307316, BE833069, AA082465, AI919531, AA450068, R64481, and BE697991.
HSKAS66	1310	905017	1 - 779	15 - 793	BE903604, BE877226, BE788807, AL525054, BE549234, BE379419, BE909447, BF033662, BE745405, BG116654, BE782991, BE729574, BE612600, BF792659, BE734296, BF686415, BE382926, BE266690, BE746235, BG167167, BE742508, BG249818, AA443445, BE747302, AI380916, BE899322, BE254649, AA054185, H68793, N36450, BE780379, H06674, BF316896, AA852859, AA428116, T71376, BE259564, H82530, H86659, BE311981, BF339777, BE829913, BE613340, BF350582, BG164618, BF130572, AW245743, BE265746, BE890771, AA838309, AW630507, BF928087, AI079540, AL110467, AA443541, AC011479, and AX041940.
HOFNT25	1311	905050	1 - 3124	15 - 3138	BF677384, BF920128, BG023825, AA077497, AA077528, AA296889, AA077040, AA076945, AW772344, AA296961, AI818971, AI818951, and AA077342.
HWBDL33	1312	905114	1 - 1857	15 - 1871	AI263085, AV715678, BF338621, AI671224, BF109307, AV733821, AI741604,

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HAABQ61	1313	905116	1 - 1880	15 - 1894	BF338099, BG165577, AW003857, AI820045, AW957974, AI523911, AW084836, AI983096, AI333432, AW188197, AW386991, AI433769, AI379333, AW438811, N41047, AW387003, AA927750, BE139611, AI435307, BF436802, AW613586, R71675, R50080, AA678318, AA748856, AA301830, R71707, AI337423, AW243869, AI382805, AA577365, AI926335, AA568182, R47922, AA057770, R48030, AA047722, R50081, BE247721, AI539624, AI698267, AI224055, BE244865, AI365443, BE076010, N47137, AA903242, BF380516, AA581759, AW975037, AW971975, AW972845, AW975002, AW976024, AW975032, AW975628, AW979204, AW972292, AW975965, AV702790, AW975105, AW974786, AW974801, AW979127, AW971403, Z99396, AW877209, AW975031, AL119457, AW979134, AW970942, AW972377, AW969791, AW979002, AL119399, AW973219, AW975649, AW975154, AW971375, AW971732, AW979090, AW969673, AW975952, AW979098, AW979238, AW973213, AW979176, AW969885, AW979294, AW969680, AW975971, AW974964, AW954206, AW975692, AL119324,

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HFPFA83	1314	905151	1 - 722	15 - 736	BE791739, AW956207, AW975618, C14389, AW949630, AW966053, AW966013, AW959597, AW960465, AW966022, AW959570, AW966029, D59467, C15076, AV720791, AW966534, D58283, AV719188, AV720150, AW959136, AW959062, AW965175, D50979, D80522, AW973474, D80164, AW966041, D80166, AW965185, AW965197, D80195, AW975621, AW978648, D80043, D80227, AW966065, AW956397, AW966531, AW962082, D81030, AW964532, AW966059, D59275, AV719557, AW966054, AW973482, AW966050, AW966075, AW966062, AV719783, D59502, AW973334, AV699550, AW978634, AV718800, AV720464, AV724520, AW964477, AW949641, AW949654, AV719468, AV699927, AW964756, D80188, AW959799, D59859, AV699447, AW958992, D80022, C14331, AW973307, AW958993, D51423, D59619, AW965177, AW978661, D80210, D51799, AW965163, D80391, AW960553, D80240, D80253, AW973541, AV720211, D80038, AV719822, AV718489, AV720203, AV718692, D80269, D59787, AW975613, AV719324, AV718440, AV718938, AV720028, AV718633, AW959628, AW960473, AW975605, AW959469, AW973485, AV718707,

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HFIDN52	1315	905157	1 - 1539	15 - 1553	AL527003, AL527047, AL528849, AL532270, AL532269, AL518481, AL517507, AL518770, BG170535, BE795174, BF980363, BG170480, AV651086, BG170462, BG164756, BF525544, BF686680, AV651790, BF691635, BE783677, BG114472,

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HAHSE23	1316	905257	1 - 917	15 - 931	BG004659, BE784422, D78812, AW972331, AW139572, AI337247, BG236174, AW139573, AW274906, AI394041, AW972326, BE348713, BG235928, BE219929, AI621023, AI681036, AI968134, AI186456, AI394092, AW972330, BE714466, BE328194, BE714457, AI962750, AW139363, AA494171, AA099288, AW135801, AI422680, AA101983, AI391640, H04128, AW630450, BF898234, AA579232, AA635382, AA613907, AA176980, AA493923, AA572758, AA494167, AA640779, BG222103, AA528491, AA572880, BG152749, BE294475, AA528822, AA468418, AW150308, AL044192, AI610362, AW090087, BF814357, BE084795, AI656270, AW970048, BF750879, BF924897, AW075351, BG105099, AI114703, BG112456, AA640631, AW161202, AA528799, AI829327, BE875959, BE909521, BG036784, AI340519, BF734768, AI521634, AW051088, AI340603, AW983783, AV682559, AL047655, AI452857, AI802240, BF344031, BG250213, BF793309, BF909758,

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HWMFE21	1317	905289	1 - 2619	15 - 2633	BF968408, AW953455, BE513085, BE889654, BE910370, BE311470, BE744228, BG167712, BG163998, BG167766, BG181007, BF219830, AW410963, BF183034, BE905308, BE273660, AW150338, BG025353, BE906937, BG024133, BG248447, BE784095, BE787695, BE894840, BG035017, BE273358, BE613036, AW068179, BF870292, AW997226, AI609947, AW190590, BF334791, AA536207, AI419345, BE247396, BF129143, BF334812, BF334774, AW303929, BF334775, BF334783, AI972206, AA076636, BF081258, BF334781, BF334779, BE736177, N47448, BF968513, BF334797, BF334790, BE789673, BF334816, BF334813, BF334801, BF334776, BF334805, BF814698, AW408759, AI126639, BE890383, BE876928, BF220216, T08688, BE709083, AA040020, BF334773, R73435, AA824249, BF844001, AW205834, BF843212, N24016, BF733515, W44967, AI141537, BF334769, BF334770, AA437330, AA427681, AA501748, AI829844, R74553, R72613, BF205734, AW001111, AW000739, BE300238, R85996, BF334795, R72682, AW410964, R82789, AA469296, AA368361, BF905696, AA469376, R64060, BF334780, AI937321, BE714858, AA293648, BF334802, AA604680, AA102469, AI476060, AL044292, BE244069, AA910937, AA295640, AI291285, BE503809, AI676225, BF813657, BE242937, BE001794, AI291867, AI416979, AW956705, AW966388, BF347017, BG015518, AA488037, AI249741, BE814656, BE786532, AI744412, C18456, AW068319, AA427563, AI601165, BF334806, BE729392,

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HHBEA82	1318	905311	1 - 5445	15 - 5459	T27258, AU140225, AI634860, AV648450, AI767588, AA894544, BE177971, BE536545, BE178142, AV689583, AI991689, AA404730, AI635347, AA195244, AW976840, BE386012, AW957842, AW665276, BF690664, BE767008, AA411217, AW236952, AW293268, AI640606, BE538471, AW467595, AW957918, AW072654, AI633129, BE856734, AI360887, AW274499, AI096717, AW081124, AI373594, AW117198,

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HWHPC10	1319	905322	1 - 1808	15 - 1822	BE742604, AL523029, AL523899, BE300434, BE621651, BF793948, AL525510, AL521264, BE739428, BE299600, BE621032, BE728133, BF027269, AL523049, BE740085, BE743407, BE905918, BF972259, BF037910, BE300271, BE746377, BE315244, BE617342, BE384312, BE544193, BF312136, BE409316, BG121594, BE866920, AL525557, BE617818, BF313357, BE272000, AI085965, BE646590, BE019859, BE387794, BE386142, BE389790, BE389031, BE962230, BE410888, AA075546, BE386299, BE300466, BE272520, BF203427, BE383794, BE277537, AA075675, AW170271, AA306026, AW051776, AL523028, BE879163, AI492240, BE391985, BE871970, AI986434, AA417668, BE387900, AI276289, AI091507, BE019858, BF684706, BE276279, AI148079, BE739093, AW168126, AI925426, AA604521, AA609132, AI200642, AW439781, W46825, BE314830, T50022, AA775791, T31817, AW884462, BF664248, AA747906, R77171, AI927129, AA576766, F28444, H55807, BE018464, BE208178, BE302077, R81379, R61827, BF998272, BF857276, AW090678, BF998267, AW952610, R61104, BE154540, AA669090, AA714715, BF916762, AI978746, BE154534, R81378, H55806, AW576851, AI190823, AW081405, AW382992, ZA1500, AW510416, BE065740, BE154539, T81932, AA622979, AA377912,

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HDPXZ89	1320	905371	1 - 3667	15 - 3681	AW003062, AI654328, BF342700, AI970963, AW029544, AW517252, AW139082, AA402041, AI652305, AW629557, AW087970, AW991845, AI656661, AA402165, AI375685, BF339423, AI151124, AW137049, AA988273, AI094361, AW517351, AI824507, BF870695, AI272209, W88691, AI739281, AW204663, AW838114, AV690544, AW136525, AW838103, AV686823, BE138897, BG013317, AV661425, BF992785, AW838104, AW838216, AI961606, AA703614, R72631, AI889195, BF872672, AW838225, AI741258, AW889778, BG180468, AI189175, AW838365, R72703, AA301981, AI307562, AI349603, AL043419, BE242319, BF805445, AL043418, AA296026, AW838363, AW838361, T60982, AW071314, AW838426, AW839650, T57409, BF930601, BE718101, AI445466, BE550519, AI206181, AI969294, AW838452, R61006, H09629, F04497, F10157, R45955, AA281795, T23509, AW165978, F09492, AA181185, T33336, F02464, AA683348, AI566949, AA285062, R41660, R41286, T90519, T05944, AA296027, AW411267, R42815, Z41597, AI146918, AA814075, AA502285, W81282, AI073440, H06731, AI754455, BE907305, AA533076, AA640833, R22967, AU159965, H18496, AI221468, AI363467, AA653152, AI468025, AA531581, AA844673, AA594903, AW082928, AA147770, R63535, AI051974, R46038, W67814, BG055535, AI085290, AI535920, AW149387, AI927282, AI018429, AI968132, BE301730, R38762, F33261, H58219, AA922589, T60927, T65146, BG256283, AI752883, R36845, BE620393, AI862638, AW580295, AI253778, BE620735, AW392670, AW858526, AW858525, AW604723, U46347, AL134527, AJ275213, D87433, AF131781, AK023995, AK022504, AJ279014, and AI656424.
HLICA89	1321	905505	1 - 443	15 - 457	AL529539, BE870722, AU126395, AL044418, R55122, BF765213, BF886482, BF886514, BF886480, BF951263, BF886073, BF887476, BF887611, BF978470, BE764027, BF886844, BF887478, BF886816, AU124203, BF904721, BG257021, BE868714, BF897927, D83782, and U67060.
HTTDZ50	1322	905792	1 - 3991	15 - 4005	AU132013, AA886981, AU140438, AV726712, AW955810, AI017106, BG260788, AV761493, AW499808, BE884030, AI082248, AW269494, AW995087, BF996055, AW994908, AW956899, AW505102, AW966361, AW995088, AW611829, AW995074, AW295094, AA470161, N23031, AI264018, BF748828, AW861535, BG121851, N23767, AI913297, AA897488, AW995078, AW504456, AW803138, AA558415, AA280845,

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HTLHL43	1323	905798	1 - 751	15 - 765	AL533539, AL535070, BE748937, BF035835, AL527769, AL527179, AU146089, BE074372, AW327290, BE538766, BE867172, AW961017, BF759319, AA235918, AW083127, BE205822, BF516089, AI798681, BF063649, T99938, AI797284, AW183981, AW410645, AI096678, AA236980, AI092936, AI144400, AI685511, AI860643, AW513360, AW273299, AI521427, AI801043, AW300673, AI074319, AI457885, AI399827, BE907388, AI885247, W46771, AW295119, AI924126, AW327628, AA651935, AI095832, H00554, T63211, AW137947, AW029034, AI393856, AI381953, AI811198, AW295118, T62960, AI458562, AA745647, AW151914, BF940829, R16113, AW198081, AW473030, AA813851, BF745269, AI823612, R43938, BE513187, T16212, BE085487, Z39341, BE908553, AA430674, BF002645, T96081, AA404569, AA884361, AA338639, and AK021918.
HLTAG56	1324	905871	1 - 1878	15 - 1892	AL522360, AL535070, AL533539, BE513187, BE748937, AL527769, AU142389, AL527179, BF939920, BE907388, BG035384, AW961017, BF035835, AL535071, BF026662, BG178845, BG116692, BE903282, BE908472, BE389936, AL520396, AW083127, AW327290, AL533361, AW410645, AU146089, BE205822, BE275255, AI798681, BE074372, BF063649, AI797284, AW183981, AI096678, AI092936, AI144400, BE867172, AA235980, BE538766, AI685511, BF516089, AI074319, AI860643, AI885247, W46771, AW513360, AI521427, AW295119, AW327628, AW273299, AI801043, AW300673, AI095832, AA745647, AI457885, AI399827, AW137947, AA813851, AI924126, AW295118, AI381953, AU141402, AW029034, AI393856, R43938, AI811198, AW151914, BE383284, AU119853, AI458562, AL527770,

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HWLHJ13	1325	905994	1 - 1172	15 - 1186	BE868917, AI799005, AI478852, BE219940, BE292871, AI825946, BE504345, BE869001, AW205093, AW502646, BF673844, AA639927, AI684054, AA634246, AA630382, BF221675, AI193494, BE841277, AI873043, AW579030, T94447, AA573526, AI566445, T98050, AW294597, T98141, BF334618, BF757622, BG150516, AW859231, T94534, AI940596, AI940601, AI922766, AA931283, AV691865, T24595, AI623271, AA648186, AI023258, BG231887, AW859234, AW369427, AW176607, AI971154, AI888177, BG014399, AW579093, AA992910, BE771632, BF757402, AK000460, AF061022, and AF061024.
HDQPN32	1326	906000	1 - 1453	15 - 1467	BF030094, BF915407, AI431931, AW080430, AI246316, AI434289, AI963929, AW013871, AA972267, BE974051, T96157, BE763960, T93692, BE045646, AW291840, AL110151, and AC006479.
HOHBT28	1327	906114	1 - 624	15 - 638	AU118919, AF107454, BE790376, AA018301, AA307511, BE244926, AL525109, AC007097, AK021727, AF190665, and AF190666.
HAQCD43	1328	906145	1 - 1038	15 - 1052	BF529722, BE875979, AW954217, BE738333, BF792671, BE785505, BE876237, BE873075, BF340317, BE734057, BE789549, BE395207, BG025158, AL532494, BE614806, BE614883, BE396147, BE253565, BF737302, AW238972, AA806231, BG012029, AA044211, BF901660, AW796084, AI537196, AA044081, BF738993, BF056207, AI683820, BF446055, BF812968, AI819836, AL532493, AI424071,

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HTPCP50	1329	906161	1 - 2183	15 - 2197	AI024852, AA724866, AI024874, AA296694, T10363, H00259, AA370362, AA364110, AW959554, BF789905, AA487827, BF156012, AW604713, AW604716, AW371737, T92143, AW382068, AW371674, AA428201, AI356048, W68208, T24766, AA429137, AF192403, AF192401, and AF192402.
HWLCJ12	1330	906285	1 - 2319	15 - 2333	BF691828, BE566444, BF207929, AI632964, BE463583, BF208992, BF541607, AA826324, C06338, AI547059, BE568426, AA622862, AI890787, BF029268, AA775044, AV706527, BB928360, AV707401, AV706532, AV702854, AV724987, AV727822, AV728455, AV702728, AV704116, AV704974, AV727103, AV708991, AV645545, AV707088, AV709273, AV703090, AV728715, AV727459, AV701728, AV706882, AV726628, AV726559, AV729473, AV651897, AV725031, AV650367, AV691615, AV706741, AV702869, AV726787, AV703515, AV645778, AV707798, AV705416, AV704592, AV705299, AV687909, AV689800, AV656240, AV728997, AV702798, AV709935, AV706223, AV706992, AV706104, AV706891, AV647654, AV702787, AV705234, AV706025, AV707942, AV704916, AV701538, AV705047, AV701496, AV709407, AV703436, AV703012, AV702832, AV725321, AV728546, AV685688, AV652156, AV692972, AV702954, AV707948, AV701874, AV705684, AV704924, AV707510, AV707420, AV707639, AV701499, AV727029, AV651503, AV728270,

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HTHCK88	1331	906306	1 - 2303	15 - 2317	AL530935, AU132769, AL048903, AI678076, BF527660, BE728354, BG253760, BE297579, BF317174, AL524551, BE409263, BE313085, AL530934, AL042801, BE729268, BE885728, AL041340, BE314879, AL042802, BE383358, AW190561, AI961484, AU154235, AW027201, AI424792, AL524550, BE259667, AA864499, AW732625, AI432437, AA917094, BE327057, AI934618, AI499074, AI344032, AI955647, AA572961, AL048902, AW769938, BF509684, BE208853, AI366484, AI342638, AI761488, AW974120, AI564533, W51904, AI168435, AW961340, AI289643, AU126961, AW971194, AW272378, AI867205, AL039675, AI796156, AA884306, BF927739, BF002574, BF869582, BF847648, AA456581, AA918441, AI766564, AA426295, AW769937, AA493778, H67555, AA322347, AA304712, AW178871, AA298993, BE273248, AA377693, AW769673, BE140495, AI383037, AA221032, AA713594, BF918942, BF918936, F24965, AW797208, AA322180, AA322590, AI940682, BF919436, BF919454, BF919453, BF919451, AI538564, BF752997, AI766348, AI701097, AW080090, AI367680, BF812961, AI619820, AI633125, AI828682, AI818240, AW152182, BF811804, AI796113, BF968679, BF669151, AI800648, AI500714, T07909, AI702073, AI884318, AI590043, AI868680, BG122005, AA740450, AI866469, AI971615, AI345415, AI934259, AI570056, AI433157, AL046466, AI819545, AI499570, AI698391, AI915291, AI434731, AI440448, AI445829, AI889189, AI638644, AI370623, AW188525, AW008226, AI699823, T69241, AI635634, AW148363, AI818350, AW089844, AI686817, AI376425, AI609375, AW051088, AI744268, AV736995, BF970652, AI569637, AW163834, AI270295, BE393784, AI471282, AW075381, AL043355, AI872423.

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HTAIJ50	1334	906718	1 - 2527	15 - 2541	BE899132, BF974503, BE745971, BE741474, BE512798, BE740840, BF793368, AL524716, AL524717, BE271604, BF204868, BE740264, BF238214, BE872021, BE545246, BE747082, BF663868, BF129041, BE271970, BF815297, BF034885, BE676712, BF732782, BF663799, BE272572, BE336644, AA683481, AW965883, BF128962, AI692400, BF238040, AW574880, AI290663, BE220608, BE562118, AI813735, AW007923, BE562263, AA632158, AW402676, BE378315, AW664458, BF446794, AI813810, AA781877, AI859765, AI199578, AA451993, AI185159, AW405591, AW138624, BE562122, AI907739, BE513965, AI765304, BF891354, AI692912, AI809143, AW873078, AW780301, N36152, AA706980, AW408467, AI673795, R43911, N36173, AW873086, AI694105, AI609752, AA938331, AA988379, W02226, BF740005, AI033720, AA530997, AA427862, AA714359, AA464240, BE246038, AA809567, AA701952, AA633571, AF009747, H99300, AW055311, AA937972, AA806446, AW512472, BG107308, AI373187, AA837900, AW583244, AA058710, AW401686, AI168434, AW583799, BG055948, N25845, R78273, AA292575, BE744517, BG007593, AI431729, R18801, BF433880, AW368604, AA658130, AW405405, AI914063, AA085565, BF817948, F32897, BG005920, BF821845, BG006191, F10944, AI686182, R78272, AA057265, BG008044, AA853743, R98243, BE272119, W32550, AI556963, N42680, AA297912, AA182006, N42929, AI659545, AI631698, AI655212, BE260535, BE312785, AW197261, BE246497, AA298972, AA297985, AA302993, BF376525, AA464348, AA806640, BE260497, N44152, BF038397, AV710096, T77313, BF315931, BF206209, AA235467, BE872650, BE261058, BF312765, N44162, BE563627, BE246466, BF591598, BE313411, BE383145, BE208274, AA310646, F13348, BE261460, N76224, AA908429, H99299, BF089972, BF312549, BF797084, BF339019, AI631977, AA908294, BE888844, BG255030, BE061378, BF339322, BE877769, AI784214, AI571699, BG253986, AI972170, BG034746, AI628851, AI860027, AI918634, BE780904, AA748353, AI690813, AW167146, AI471227, AI479292, AI888665, AW196078, BF032910, BF752892, BF822127, BF911528, BE874133, BF526117, AW673679, BG122101, BE889355, BE783752, BF816031, AA641818, BG117653, BF814447, BF032768, BG254745, BE875243, BG029053, BF753053, BE047952, AI783569, AA761557, AI932638, BE892572, BF033366, AI918408, AI863382, AA715307, AI815239, AL043089, AA809974, AW167222, AV755207, BG029058, AI440238, AI583578, AL525204, AA195940, AA804877, BF343394, BF184587, BG179438, AW409772, BF344507, AI926593, AV758017, AI652336, AV712838, BG035423, AV713908, AV713988, AI681952, AK024953, AK025870, AX011622, AK027115, AK000432, AP001699, S36676, D44497, U83980, AJ012755, AL133069, Y10655, AL157431, U49434, AC002500, AR083279, AL137656, AF141289, AF199509, S61953, AF153205, A08913, AL389935, E12579,

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HTEKL48	1337	906879	1 - 1825	15 - 1839	BG120166, AU140711, AA861915, AW270710, D31054, AA318116, BE908185, AA146739, D31077, AI000735, D31287, D31360, D30987, D31063, D31067, AU140525, AI356440, AI620666, R94909, AA135761, H94979, AU158859, AI078409, AA838091, AA847508, AI285493, AI310992, AI300818, BF926426, AA847427, AI653783, AA702717, AI791659, AI246996, AW272389, AI915081, AA228442, BF805088, AI620992, AW157005, AA171892, BF876674, AW275432, AA664126, AI028510, R79396, AL045476, AI800426, AI355246, AW328446, AU159185, M77964, AA302978, AA484892, AI031759, AI049504, AW302017, AA992126, AW020150, AI537368, AI521525, AW151247, BF901147, AV759632, AA714011, AA533054, AA810158, AW979295, AV762975, AI061313, AI277373, AA831408, F23327, AW974363, AA829565, AA015948, AV764001, T74524, AW074223, AI278440, AA676592, AA206707, AA085410, N63149, AV764406, AV759971, AI537800, AA515176, AI431513, AA715173, AA715075, AI278972, BG034698, H91062, BE392753, AA632765, AW013787, AI709174, AA846923, H57752, H54706, AI299442, N71619, AA657835, AI926102, H02532, AA487209, AL044701, AA513780, AA668362, AW150387, BE327876, BE501670, H63660, AI732502, AA862312, AA568949, AI124798, AW028376, AA302661, AW274078, F35684, AW978041, AW303052, BF991881, BE246411, F34506, AV761486, AW502796, AI355103, AW328202, F23338, AI821645, AW341978, H84412, AI587349, AI859906, AW272815, AA084609, AA354695, AV760615, AW467497, AA857673, AA019003, AW194046, AW511778, AA635150, AA502110, AA568204, AA570740, AU158351, AA483606, BE856399, AA831714, BE300991, BF845126, AU159566, AI254779, AA229823, AV762245, AI962030, BF817511, AI334896, AW769221, BF991882, AV718585, AA338289, AW872676, AA152398, AI332615, D31762, AL049611, AC007192, AL121989, AC011490, AL136105, I34294, AC005067, AC006120, AC007546, AL117334, AK023869,

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HUVFI01	1338	906880	1 - 1366	15 - 1380	BE908185, AA368455, AA861915, AA367693, BF329956, BE838501, BG120166, AI000735, BE818784, D31762, and AL049611.
HHAOD94	1339	906886	1 - 867	15 - 881	BE614475, AW960560, BE788855, AV728059, BE865963, AW978143, AV696408, AI042012, AI309836, AI927975, AV692206, AA909011, AL529245, AI435369,

					AW510857, BF002030, AI123581, AI435845, AA523865, AI379585, AW466951, AI379067, BF239904, AV721198, BE613870, BF672390, AA165447, AA724150, AI305828, AA166930, AA903029, AI803108, W37757, BE966249, BF210595, AW090552, AL529244, AW057808, AI979048, AV729106, AI275564, AA846157, AI480120, BE565691, AI261287, BE879682, AW024836, BF207871, AI378473, BF213084, AW055277, AA432110, AA166742, BF513222, BE958210, AA847776, AI302632, AW183927, AI333279, BE567812, BF217310, AI333555, AA822892, BF132353, AA622738, AA004875, AA026907, AW630584, AI810768, BE566185, W47137, AA889030, AI041885, BE856489, AI859471, AA903036, BF086448, AI299262, BF667487, AA253191, N66602, N24907, AA807315, AA688151, AI216850, BF574268, AA743282, AA700530, AA904997, AA524225, AW241799, AA079684, N52361, BE904974, AA461494, BF694328, AW129508, AA165446, AW129517, AW958198, AI219336, AA931977, AA974746, BF241795, AA253190, AV714149, BE567899, AA805281, AA584253, AA167074, AI753402, AA292252, AA446795, BE781669, AA167433, BE886046, N30030, D62818, BF212797, BE926436, AA649222, AA005078, BF668915, BF211500, AA334848, R31063, BF244900, BF208449, BF690906, AW978144, AA167434, AW604559, BF754702, AA906255, AA455049, BG170146, BF029339, BF217280, BF103549, AA907735, BF247359, AA329536, BG170232, N36033, BF698746, N75132, R58189, AI804435, BF211073, AA779629, AA236702, BF530881, AA972503, BF029660, BF244908, BF696659, BF218193, BF184621, BF217003, BE565626, AI750420, BE565391, BF574941, BF677397, BE865942, BF239234, R31544, N93054, BE567889, W37976, AI869408, BF240004, BE567085, BF672085, BF669008, BF215923, BF091205, BF208918, AA093426, BF693944, BF239697, AA344673, AA079814, BF993950, AW392722, BF217631, BF028978, AA173470, BE565284, AI869471, W47186, W21391, BF027765, BF245946, N40739, AA460569, AA377054, BF208304, BF208334, BF696911, BE184246, AI750419, BF208981, BF738903, BF216171, BE567327, BF851236, BF851329, BF695321, AA304600, BF849551, AF220193, and AX014830.
HAGGF22	1340	906890	1 - 1008	15 - 1022	AL529245, BE879682, BE904974, BF694328, AV714149, BE886046, BE781669, BF212797, BF668915, BF211500, BF208449, BF029660, BF690906, BF103549, BE565391, BE565626, BF211073, BE567085, BF530881, BF574941, BF207871, BF672390, BF184621, BF210595, BF239234, BF213084, BE788855, AV696408, BF677397, BF672085, AV692206, BE613870, BE565691, AV721198, BF669008, BF693944, BE958210, BE567812, BF217631, BE566185, BE865942, W37976, BF132353, BF754702, AW958198, AA165446, BF667487, AA167074, BF574268, BE926436, AA446795, BF028978, AA167433, AV728059, BF240004, AA292252, BF241795, N40739, BF217280, BE865963, AW630584, BE614475, BE567899, BF029339,

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HLJDM86	1341	906945	1 - 1024	15 - 1038	BF183063, BE563477, AV714909, BF694698, BE264399, BF309297, AV718354, BF790702, BE618507, BF574309, BG117601, BF126262, AA081317, BF791060, AW963352, AA081069, BF669379, BF696374, BE546641, AW998561, BF672527, AI760705, AW613352, AA583555, BF696260, BE254980, AW516799, BF106200, BF693973, AA613825, BF672626, AI889240, AV757965, AA587284, BE872261, AA083412, AV757328, AA808601, AA081316, AI038580, AA081068, AA582220, BF693705, BE741227, AW339067, AW873560, AA002210, AI241025, AI589815, AA702349, BE206002, AA706461, BE222625, AI339472, AI278615, AA810681, AW969788, BF969029, C15625, BF576801, AI300351, AW629783, BE932023, BF477369, BE968768, AI002420, AI246117, AI204990, AA576532, AA535219, AI254335, BE207918, AA126891, BE932022, BF802514, AA047389, AV758059, AA757504, BE019124, AA491648, BG178573, H24548, AA552624, AW166093, AA291782, W65448, H21199, AI695529, R94014, AA588653, AA612737, AA047388, R93970, AA258634, AV748351, AV757264, AI093359, AW338867, F24073, BF058459, AA635784, AW089945, AI364149, AA341867, H49123, W56776, H56519, W72672, AA972572, AA977835, T78543, H38957, H39163, D81084, AW472827, AA860220, H42518, AA976833, AV733987, AA303509, F33199, AA373213, AI961781, W23242, W65449, AA341866, BE408555, F28531, AI362352, AW104215, BG165993, AI565548, BF855571, AV756580, H49058, AA322301, BF378518, AW369291, AI243405, AW572771, H43518, BE939435, F18517, AI989915, AI184202, H78051, AA620904, AI203360, T68394, AW057890, AA095300, AI972971, AI219198, BF693179, AA294896, BF680134, C02623, AA056395, AI191986, AI420162, W56729, AA772764, D81309,

					AA765171, AA056509, BF246975, BE939433, AA759158, AA128119, BF576828, AA494491, AA182888, F35795, AI888406, BE958603, AA363358, BF699367, AA376963, AA258633, AA471099, BF692982, AA669699, AW804290, AA291712, BF326227, AW592923, BF802509, C21458, BE778549, and AL031846.
HTJMG26	1342	906957	1 - 1107	15 - 1121	BG121400, BG118404, BF306259, BF528723, AA481719, AW949841, BE829270, BE299893, AA378941, BF528144, BE843780, BE938337, R48482, AA378942, BF205635, BF312731, BF968921, BF869691, AA453537, BE257879, BE902633, BF918415, BE276412, BE874333, BF981372, AW602596, BF965837, BE747984, and U62317.
HDPJZ04	1343	906960	1 - 999	15 - 1013	AW963155, AV721179, AA535015, AA361063, BE175194, AA361359, BE568285, AI741964, BE766706, AR035946, and AY009090.
HNTND88	1344	906998	1 - 2118	15 - 2132	AW974565, BE465838, BE896596, BF110512, AW401563, BF132071, BF906106, AA778112, AW043761, BE622903, N92222, N99087, AW025041, AI650274, AW611842, H00110, AI498392, AW591259, BE940082, T77228, BE707498, T90917, H05042, AA814016, T77441, Z45154, AA927671, AA649015, Z21390, Z21389, BF954192, AA282015, BF949965, N64488, AW771200, BE622071, AA824472, BE766287, AI907811, BE002253, AJ011863, AJ133721, AJ242864, and AL133517.
HJABT11	1345	907007	1 - 1588	15 - 1602	BF526575, BF340843, BE617621, AW007033, BE616972, AI420450, AA310512, AI742814, AW272594, AI632431, AI360129, AI129711, AI473688, BF513674, AI369881, AW205204, AI871183, AI969609, AA310177, BF000580, AA161488, R43162, AW865787, R49031, AW956079, AA809519, AA371832, AA353952, AW865615, AA364455, AW955845, AA365292, AW593991, AA367338, AI088287, AA335911, AI950476, H90387, AI620424, R37467, BF892009, AL117495, AC025605, AC025605, and AC025605.
HOUCY70	1346	907030	1 - 1469	15 - 1483	AL533390, AL529681, AL528191, BF966448, AL523718, BF966576, BF115284, AL528190, AL529855, BF115429, BG120879, BF304689, BE728367, BF304827, BF305469, BE793198, BE297311, AV704155, AW993505, BE789342, BF026199, BE785817, BG114227, BF316927, AW993825, AW993830, AL529854, AW960096, BF831956, AI743647, BE386416, BF727063, AI923650, AI860279, BF057404, AW965178, BE260405, AW005358, AI146421, BF928251, AI093908, BE047374, BE813316, AI769656, BE265484, BF747949, AA605064, AI241016, BE277343, AI148817, AI318082, AA565734, AI630731, AW025017, C17555, AI566682, AA843395, BF838669, AA506224, N31961, AW134754, AA749014, BE774133, AA827318, AA346026, F36487, AV750102, T49220, F31348, W31773, W04672, N31991, AI827206, AI630730, BF990595, AI678457, BF955698, AA879426, AA120831, AA948142, AA345290, AI685001, BG007518, BG011225, AA120830, BE774243, BE073338, BG004311, BF155353, T49219, T39496, BE774391, BG007508, AW374473, AJ299442, and AJ297884.

HWAEL33	1347	907053	1 - 1460	15 - 1474	AI143226, BE798123, BF792579, BG027947, BF512811, AW960702, AA074614, AW973179, BF793801, BF970034, AI816250, AI336874, AI359462, BF196595, AI920941, BF208847, BF683421, AW404001, AA041535, AI619673, AW080448, AA312966, AI248170, AA552215, AI864909, AI161255, BE393360, AW027101, R54079, AA613058, AA953791, R60168, AA426568, AI697713, AA082536, AI269146, AA989378, H21497, AA877154, H98486, BE563486, AI206064, BE396204, AI582707, AI587399, BF677141, AI144140, AA527643, AI282213, BF213405, BE832689, AW574900, AA376459, H29536, AI200580, AA329522, AW662882, AI927727, AA318044, AI263946, AA039912, AI223111, AI912507, AI829375, R49273, N40052, BF842875, AA091789, F36491, AA425093, R39339, AI557366, T24757, AI816330, R43134, R60167, AA873687, AI266123, AW361339, AW996248, AI872739, AI561274, BE714945, BE714961, R17888, N31309, F31801, H29628, BF904855, BG119615, D26032, C00043, N27118, AI005232, R54127, AI052315, AA301581, BE241764, N22922, H39166, R34889, Z42344, and AF118094.
HNHCM07	1348	907060	1 - 825	15 - 839	BE545073, AJ003572, AP001065, and AP001754.
HELGY02	1349	907105	1 - 4289	15 - 4303	AL537332, BG248293, BG180938, BF530592, BG036300, AV687059, AV713521, BF309002, AI902578, BG255127, AW961656, AV713522, AI688582, BF033768, AL449775, AW961690, BE222964, AL449520, AL449853, AW379424, AA777773, BE074312, AW369760, AW817922, AA703884, AI907963, AW469363, AI423137, AI972020, AL449774, BG180714, BE763237, AA916666, AL449776, AW385387, AW385386, AW071058, AI908566, AV657574, AI356198, BF215093, AW571570, AL449852, BG056230, AA308054, N26808, AA088691, AW152059, BE869116, BF058599, AI905077, BF091968, AA424942, AI694175, AA747032, BF511716, AW074054, BF058917, AA625170, AI985668, AA937352, AI336688, AI160378, H49126, AA227090, AA865313, AI283958, AA506775, AA043012, AI093888, AW591247, AA612659, BE869597, AW814515, BF058919, BE009973, AI040102, AI632877, AI872785, BE138844, R91358, AA506766, AI634278, AW750450, AW084196, AW591257, AI205158, AW814523, AW887630, BF951557, BF987510, AA424941, AI207271, AL449521, BE719403, BF802463, AA347025, R14440, BF350102, AA294950, BE669443, BE930340, AA226793, N39498, BF925727, BF839347, AA323130, BF840126, BF840116, AI678509, AI824415, AA716420, AI905195, AW380731, BF951628, AI207949, BE932832, BF089218, AW511665, AL449517, AL449850, AA347026, BE933440, AA337170, AA295197, BE870271, AA304723, BE697774, AL044263, AL449851, BE714259, BE774940, AA332792, AW841996, AW814519, AI524587, AI682702, BF754877, AI537066, AI301807, C00596, AI939550, BE167292, AW799520, N68237, AW799639, BF351410, BE714206, T24948, AA223662, AW817566, BE714385, AW841997, BE697747, AW881813, AA042886, AW817547, BE714392, AA506788,

					AW188897, AA506790, AW517462, AW385396, AB033073, AL133001, AL034418, AL121777, AA494379, and AI633048.
HTAFC46	1350	907218	1 - 710	15 - 724	BE312559, BF314071, AV690059, BE068804, AW366386, BE707038, BF350952, AV698838, BF359015, BF350939, BF884094, AW149741, BE177434, BE814246, BF352350, BE931536, AI077488, BF987117, and AK024996.
HRADL67	1351	907233	1 - 3949	15 - 3963	AU117742, AU131411, AU118148, AU123586, AU125301, AU119889, AU123800, AU119764, AU139552, AU131384, AU133198, AU134838, AU121056, AU138221, AU139208, AU136271, AU137377, AI114486, AW149501, AU133881, AV702813, AU135345, BF793684, AU128114, AU123493, AI676177, AU138746, AU146113, AW954670, BG027795, BE539265, BF968029, BF246292, BE907443, AW366152, AI264321, BF035348, AW007145, AL043600, AV734239, AW262031, BG177703, AI913362, AI809112, AU154494, AW439637, AW274948, BE545745, AV716220, BF576792, AA528650, BF677952, AV734173, BG117467, BF431901, AW962778, AW954329, BF032312, AW365592, BF035872, AI769386, BF815925, AI861995, AW993642, AW957290, AW262046, BF891910, AW304221, BF032821, AU146961, AW088767, BE999985, AW803561, BE815133, AA488372, AW270549, AA131841, AV681644, AI751098, AU123402, BF812944, BE885546, AI417167, BF475544, AA176233, AI279263, AA032181, BF891892, BE882148, AL042007, AI753126, BE813363, AU152464, AW361159, AU154454, BF589859, BF673032, BF694378, AW631121, BF892001, AW866965, AW021494, AW370294, BF892000, AI751099, AI635275, AI828400, AW298688, AI954976, AW853329, AW772486, AW088237, BF108754, AA489879, AW088533, AW794968, AI554278, AA994206, AI378180, N94529, AI956030, AI341810, AI283284, AW272723, BF697268, AA179494, AA179544, BF751906, AW572262, AU153148, AA947267, BG260830, AI225127, AI961066, BF672509, AA780586, AW029520, AI082442, AA131810, AA464824, BF057738, AI129837, AU158071, AI078756, AW803560, BF155374, AA131791, AI753674, BF672202, AI476626, BF338523, BF983647, AA082761, AI088460, AA122245, AI559651, N40983, AA613946, AA075711, N24153, BF673079, AW473312, R51676, AW152173, AA248233, W46377, AA782289, AI621172, AW189239, AA447159, BE928765, AA491455, AW615021, BE464786, AW150265, AI688932, AA081106, BF739297, AA443787, BE463667, AA100948, BE879171, BE156528, AW303903, AA715420, T71302, BE003463, H12095, AI750347, AA081203, AA307456, AI888370, BE815129, AA598996, BE542657, BE706451, AI927255, AW979155, AW168975, AA554742, W46205, AA906052, AI651058, AV720700, AA774052, AW069272, BF807817, BE003445, AA313231, BF807740, AA580843, BF901485, AA780297, H00132, H95033, AW380447, AI687631, AA127351, AW022573, AV757316, N22607, AA127352, AA114152, N44992, BF817651, AW302346, AA376293, AW771338,

				AW812765, AA370606, R13430, AI750372, H05061, AI200617, AI873904, BE156534, AW130743, BE089341, AA034524, BE141809, AA424618, BF330094, BE141241, AW807657, AI584085, T55687, AW058451, AI205266, BE141142, BF941335, AF116620, AK001700, AB037803, AF298897, AF116669, AF249673, AF273024, AF173682, AC008014, AB016226, AL137658, AL353957, I89947, AK026642, AF314091, AK027113, AK026522, AL133113, A65341, AK024538, AL117460, I48978, AB049758, AL137488, AL389935, AF116631, Y16645, AK026927, AL133558, X79812, AL049382, AB052200, AB041801, AF158248, A65340, X80340, AL137479, AL133067, AL122050, AK026506, AL080234, AK026480, A77033, A77035, AF031147, M27260, AK000718, AL133665, AX027129, AK026542, X84990, AK027096, AK026959, AK026583, AF111851, AL137550, AK026504, AK026894, AK025375, A08916, AK000137, AK026528, AL162004, AK000652, AF114170, S36676, AL133081, AK026741, AF130066, AR013797, AF119899, AL137557, AL050024, AX017991, A08913, AL137459, X06146, AK027164, AL133104, U53505, AF130105, AL117394, A08910, AK027116, AK024524, AL110196, AK025414, AB048974, AK025491, AF116646, AL133075, AF056191, AL133619, AL133637, AF119909, AK025092, AR034821, AF104032, A86558, AF116682, I48979, AR020905, AF119883, AF218014, AL137271, AL050393, AL359600, AF113019, X82434, A08909, AF100931, AK000432, AB050410, AK000690, AF111847, AF177401, AL049283, AF183393, AK025465, AF090900, AF008439, AL353802, AF116639, AF113677, A08908, AF177336, AX045627, AL389982, AK000647, AL117457, X93495, I00734, X72889, AK024594, AF155221, AF119894, AF113690, AF097996, X62580, AF130100, AL162006, U87620, AF130087, I09499, E00617, E00717, E00778, AK025967, AL050138, AF113013, A18777, I89931, AF090943, X72387, AF067728, AX042059, AF215669, AL133080, AL359583, AK026947, AK026613, AL389957, AL133640, AL110221, AL133568, AF130110, A15345, AB019565, AL117648, AK026630, AR087170, AL162083, AJ000937, AF118090, AF116654, AL137529, AF130077, AL389951, AK026532, AF102578, AF078844, AK024992, AL162003, AL122111, AF119875, AL162062, AL133072, AB052191, X81464, AF130059, AL122110, AF090934, AK000247, E05822, AK025339, Z72491, Z82022, AL137648, AK027204, AL359601, AF090903, A03736, AR038854, AF119896, AB038698, AL359941, AF116688, AX019230, AL117649, AB050431, AL023657, A08912, AB047904, AF017437, AL080137, AF106657, E02221, AF057300, AF057299, AL050116, AK026592, AB049848, AL133560, AK026534, AF116691, AF207750, Y11254, AL080159, AL390154, AK026744, AF111849, AL050149, AL137558, AF090901, AL122093, AL096751, AL117435, AK000486, AL080163, T40360, T41217, T48055, T54140, T54236, T55605, T71443, R21187, R21836, R22805, R27255, R27457, R32731, R32732, R33830, R33829, R34166, R34290, R40942, R40942,

					R65860, R76715, R76714, R80048, H12096, H42622, H93998, N24862, N68134, W30754, W74015, AA031981, AA032011, AA033656, AA081604, AA084455, AA113863, AA129180, AA131777, AA176321, AA188816, AA228705, AA588571, AA664787, AA720525, AA728805, AA730793, AA836530, AA913305, AA916890, AA935302, AA947363, AA642013, AA089634, AA654510, AA214323, AA214164, AA214413, AA214414, D11838, AA450296, C75177, AA599984, AA844166, AA883641, Z38723, Z42531, D29105, D29471, D11627, AI358614, AI364432, AI367281, AI440275, AI446275, AI538202, AI272670, and AI669361.
HDPQA54	1352	907253	1 - 1422	15 - 1436	AW612141, BF196066, BE221739, AI247270, and AR035943.
HCFCS40	1353	907375	1 - 4398	15 - 4412	BG164191, AL135185, BF983123, AL041280, AV645574, AV687584, BE788908, BG250650, BG115164, BF342638, BE876977, AA702184, BF671348, BG248849, BF351087, AA152030, AW474133, BE539165, BF513442, AW269763, AI962971, AA935874, AI150109, N34238, BG169542, AI554409, AW007775, AW468469, AA890008, AW021321, AI082758, AI922307, AI199306, AA282370, BE547356, BF248155, BF374008, AA037349, AL041279, AI688218, N22419, AA278551, AA406318, AA152104, AI367278, AI797211, AA203606, AA258062, AL038734, AL038733, AI089356, AA884389, AA017390, BE930063, AA233026, AA661741, AI082269, AI770119, AI824725, N31270, AA421935, AI027376, BF352616, W39547, AA918822, N25640, BF352611, AI027020, AW876088, N39100, AA911009, AA836812, AA992896, H04053, AW876064, AI002479, R55560, AA970541, AW995402, AA332109, AA806318, AA759257, BF885893, BE177081, AA232852, AA593839, AV697997, AV695832, AI797333, R68540, AV690252, H68957, BF926234, AA485458, N22883, AV734002, AA337924, BF820595, BF926247, AV694870, BF820597, AA384849, W44899, AW241214, H65584, H03366, Z19311, R67924, AA017389, R55321, T67446, AW243674, BE048922, N70432, AW876067, BF759974, R68246, T96801, T96685, AV696911, AA236633, AW965295, BF763395, AW876091, BF927515, BF820591, AA376097, AA994146, BF858626, AA336479, R36914, BF755224, F00568, N48457, AA282020, AA094925, BF735336, T69479, BE714862, BF126700, AW103805, AW799660, BF924148, BE165021, BE542967, BE161951, AX013176, and AC009778.
HBINS69	1354	907522	1 - 1506	15 - 1520	BE744673, BE798562, AI885021, BF125194, BE272386, BE900634, AV704849, AA847540, D79183, BF984445, AA056301, AI743182, AW964737, AA662370, AA628098, BE798920, BE896215, AA805301, AW085647, AA020747, N25407, AA324846, AI338738, BE278163, T08103, AA470718, N20503, AA905832, AA453580, AA021086, AW801726, H39227, AA758607, BE280813, AA866217, H47609, AA022758, AA464399, H97699, BF196339, T81265, H85035, H16214, R89033, BE900826, AA019794, H84973, AI743505, AW375043, AA861258, BF752258, AA308868, AA013293, BE901092, H16215, R38881, AW998123, AW998127, AA974506, BE560672,

				AW998124, AW998121, AI337504, H47693, AW998125, AW998120, AW998126, BF217168, AA331372, AW821670, AI568114, BE879967, AA830709, AL513723, BG108406, AI682798, BF340889, AI925404, AI569975, BF724894, AW193026, AL514063, BG110509, AL514015, AI590686, AV656595, AI207656, BG105240, AL515195, BG058052, AI685080, AI580290, AI698391, AV758209, BE883170, BE963691, BF526020, AI874261, AI345612, AV692771, BG112718, AI345415, AL037030, AI446092, AI446373, AI567846, BF667290, BG001293, AA502794, BG111673, AW129264, AA788861, BG001235, N29277, AI567944, BE544111, AL119863, AV755713, AI345416, AW083374, AI636137, BF872663, AV658585, AI648508, BE963872, AI866770, AI288285, AA470491, AL045360, BE048238, BE964999, AI890907, AI538850, BF812960, AI866469, AW630386, BE018334, AW020419, AI499974, AI242248, BE892835, AI627893, AI766348, BG030915, BE963838, H89138, AI873638, AI884318, AW160916, AI673363, AI285586, AI689388, AI184903, AI612750, AI470293, AI565125, BF750879, AV756256, BF868489, AW168503, AV743631, AI539800, AW026610, AW129659, BG027967, AI824576, AI623682, AL515191, AW190286, AI874243, AI245008, BE966699, AI609331, AI365256, AW089640, BG180273, AI633477, AI866111, AI702406, AL046942, AW129929, BG151388, AW020397, AL121041, BF792961, AL513817, AW827106, AI802542, AV711124, AI678446, AI445588, AI688918, AI961589, BG029829, AW087462, AI829990, AL514359, AV756148, AW827289, AW058233, BE965415, AW023338, AW167086, AA908294, BF035653, AW089275, AI932794, AA580663, AI376872, F37439, AI277325, AI659795, BG112239, BE543089, AW131999, AI624529, BF814449, AI631216, AL120676, AW403717, AI919500, AI619992, AI915291, AW002342, AL042745, AL039086, BF924884, F37323, BF750886, BF794025, AV704109, AI933992, AI623941, AW169848, AW827204, AI690946, AW089006, AA493923, AI633125, AI934000, AL360165, AC009484, X79812, AL133075, AB047878, Y10655, AF067728, AX042059, AL133624, AK026855, I89947, AF026816, Y10080, U67958, AF183393, AL389957, AL389935, AF119899, AK026164, AL117649, AF061795, AF151685, AL133113, A21103, AF036941, I48978, AF113019, AF118070, AL157431, AL162083, AF116614, A08916, AL137550, AL122045, AL137479, AK026408, AF119883, AK026504, AF217966, AF130077, AF267849, AL117435, AK024594, AL137557, Z82022, AK026630, AK026924, AL117440, AL122123, AF090900, AF116698, AK027081, AK026583, AL050116, A03736, AK027204, A08913, AK025632, Y10936, AF130099, U78525, AF067790, AL389939, A18777, AR059958, AB050410, AF159615, AL133016, A08912, AF030513, E02221, A08910, I68732, AF285167, AR038854, AF314091, S75997, A08909, Y11587, AL050024, AB047897, X63162, S77771, AL137488, A08908, AF111851, AL161953, AK027193, AK027182,

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HKGAO47	1355	907635	1 - 2412	15 - 2426	AL516848, AL528521, AL532885, AL516847, AW953467, BE797036, BF971239, BE277256, BG030783, BE314534, AL524574, BG248512, BE274654, BE887732, BF980855, BG114238, AW952375, AL524573, BG168745, BG117496, BE408506, BF025874, BE251536, BF685821, BE407256, BF206705, BG122732, BE787761, BE160865, BF795032, BG031786, BE874538, BE302826, BE870602, BF315886, BE266639, AA625438, BE619329, BG032767, BE160871, AL515859, AL528491, AI114830, BE256065, BE501405, AW806578, BE613878, AI888470, AA460071, BE160926, BE384830, BE858432, BE018503, AA449625, BF980608, AW390336, BF991251, N30481, AW606819, AA453912, AA449364, AA181642, AA962493, AW238824, BF793448, AI541176, BE536961, AA303856, AA664410, Z45856, R91016, AA021128, R01296, BE302562, Z45333, T35285, F07972, BE879362, BF939656, AA876364, BE251889, AL515858, AA356807, AA453405, T09074, AA326030, R67734, AI753358, R58120, AA233437, AA181590, AW007020, R00170, R12025, AI541177, AA171676, AA071433, AW264634, T35906, Z44193, AI191796, AW844823, AI421512, AI025786, AW971230, AA493570, AI890440, AA096046, BE617049, AA740894, AI087296, AI357750, AI359043, BE966257, F05632, AI762115, BE302107, AW673743, AI969009, AA639573, BE964421, AI374649, N35575, AW082616, N28421, AI963705, AA256664, AA706251, BG112925, AA536062, R88757, AA910229, AW191063, AW021536, AI376207, R00171, AW338398, AA256647, BE300516, AI920903, AA862554, AR058922, AR058923, and AA169634.

HMTBI19	1356	907637	1 - 1887	15 - 1901	AU142702, AU119065, AL534353, AL521573, AL520886, BG261209, AU128570, BG105210, BE890380, AI525838, BE875026, BG171230, BF673691, D82449, BF029537, AL521572, D82382, AL520885, AW376421, AA129508, D82521, H08387, R50903, BE539381, Z21167, BF698848, W15176, AA356128, BE080252, T10839, AA361954, AA079011, AA371059, R13122, AA090366, H93896, H70501, AA234409, AA398807, BF853725, BE085643, BF057243, AA171920, AI681965, AW295732, BF222743, R06937, AW069716, AA278525, AW582778, BE551467, AI540236, AI126144, AW665698, R89794, AF077040, AK022931, and AF073344.
HPMGN27	1357	907728	1 - 899	15 - 913	AV747831, AV745151, AV749820, AV749111, AA435798, AU149616, R05725, BE614499, T84168, AI825005, C00159, AW937334, AF155109, AK001334, AJ271670, and AF069992.
HWLEP57	1358	907757	1 - 1235	15 - 1249	BG165370, AV692456, BF668554, BG165006, BF699229, BF664617, BF696359, BF666897, BE958515, BF666680, BF669635, BF542034, BE958350, BE958087, BF382058, BF700761, BF670202, BE958295, AW583705, BF246687, BF698234, BF697105, BF700216, BF665797, BF698503, H48650, BF029934, D60241, BF666952, BF701837, BF695871, BF032034, BF669697, BE958612, T50929, BF696365, BE959288, C15568, BE536963, BF695972, C15261, D81750, D81691, R24902, BF700708, BF697847, BF700926, BF665003, BF131792, BF698021, AV690200, BF381642, BF246840, BF666285, BE739347, AV686169, BF696358, AB041548, and AK027169.
HADGF57	1359	907775	1 - 2812	15 - 2826	BG110446, BE891269, BG110027, BG035236, BE731780, BF000371, BF002083, BF699552, AA203416, BE901012, BF668363, BF700122, AW468560, AI432381, AI472313, AW273216, AA456638, BF697167, N36310, AA002173, AI432405, AI093711, AI332435, AW513379, AI081893, AI276146, AW131136, BE709774, AI769316, AA490628, AI288215, AI925214, AI274062, AW272533, AI081206, AI564061, AI189285, AI018502, AW021180, AW512284, BE049226, AW103397, N24890, AW022522, AI627363, BF095661, BG179869, AA703639, H49171, BE973929, AV722359, H95212, M85398, BF197913, BF666693, AA320240, H68371, AW274140, AW305315, BE872984, BF982148, H60779, R62178, BF966361, BE934144, AW800606, AA303421, AV724758, AA320393, AL121248, H61001, BE087853, AA320244, BG178065, AA320212, H60780, AI143497, AA861862, T99655, BF589579, R64567, C15951, N67278, AI286184, R41271, AA629128, R07730, AA902645, AW272977, R37064, H68372, BE646330, AA296635, C21127, AA320458, AA228880, BE816050, AA320132, R07729, AI206521, AW131190, AW009618, T99057, AA759131, AW391393, AV713941, AW391388, AW391383, AA773496, AW391384, R06939, AA662337, BF834102, and AA700982.
HDTIC42	1360	907776	1 - 1501	15 - 1515	AL515760, AL518517, BF037353, AW131613, AI798698, BE856584, BG116789, BG110336, AV729019, AI659391, BG259433, AI383966, AI301904, AI141050,

					AW051534, AI436572, AL518516, BE782794, AI423024, AI949462, AI765807, BF002684, AI860169, BE263704, BF038559, AI361220, AA669355, AI917250, BE855659, AI127630, AI206098, AV708539, AI025741, AA102584, BF590538, BG025061, AV713929, BE552015, BB467899, BE931563, BB908505, BF739931, AI379587, AV708793, BF508131, AI660603, AI092712, AI445710, AA232806, AW195884, BF970494, AI750128, AA773721, AI081798, AI858261, AI371779, BF727334, AW842934, AI379674, AL515761, AW958989, AA557338, AI246467, AI085334, AW205857, BG150106, AA446521, AI275393, AV724954, BB815162, BF381071, AI803647, AA534301, AI200736, AI275421, AA442342, AL532361, AA677318, AV719438, AW024979, AA780999, AI682250, AW797736, AA354775, AA400736, AA890704, AV724659, W20040, AI492629, AI378226, AA825312, AI623977, AI800704, BF211880, AW130062, AV750137, AI751864, AW003455, AW015559, AI751865, AI983914, AA885942, AA906852, AW051657, AA437265, AA773840, AI568957, AW190646, AI276712, N62947, AI278977, AA233861, AA232534, AI274077, AA708681, AA232099, AI222157, W74448, AV657169, AI559955, AA987704, AV726772, AA400461, AI225079, AI024657, R83674, AA235866, BF941920, R83686, AI241402, H27797, AW193093, AA970287, AW613994, AA358446, AV652934, AW450241, AI363499, H51031, AV708338, BF514709, AW195372, AA928622, H28191, AV656529, AV726799, AA625934, AI916024, H52549, N63163, R83661, AA669356, AI769946, N91378, N79850, AW103180, T86281, BF063502, AI435315, AI208326, AI784521, AI350985, R79809, R83660, AV749408, T72660, T67465, R83685, BF887312, R83673, H28234, AA296079, AI471621, BF887307, BF813453, AV748030, AA315225, H51032, AW471026, AA364922, AA430360, F32350, AA306937, BE672340, R86312, T86380, BE312899, D79226, AI268212, H26813, AI910377, R86311, R79909, AI567136, AV751141, BF509547, W72762, AI203285, H60248, AI869518, H88268, AA918002, BF514715, R86296, H80916, AI567085, T72729, H28014, T96316, AA634691, AI471363, R86297, BE645725, AI284210, D20230, D58181, H52153, T99806, AW299944, T39986, AI758516, BE048710, T98500, T93486, AA095338, AI244569, T99911, AV728923, AI432316, AI583987, AW054877, D57273, AF136411, T69498, H88269, AA082118, BG055457, BF478006, AI093819, AI458482, AA495794, AI091031, AI583515, AW194818, AW780413, BF960944, AV735235, T98445, AR030960, AF171875, AF155650, AC010285, A84916, AA236068, AA644472, T11390, and AI342813.
HHEXO20	1361	907816	1 - 2433	15 - 2447	AL527888, AL527889, AW976173, BE781680, BF343138, AL525819, AA702154, BE732112, BE884555, AI703131, BE551051, BG115556, AA702126, AI634536, AA777413, BE670816, AW187982, BE887877, AI694395, BE791388, AI248701, AA393120, AI298112, AA463417, AA463415, R43806, AA070569, AA714855, AW339437, BF881875, AA767682, AW000977, AI334193, BF763234, AI268559,

					BF094236, AA463416, AI886057, BF508517, F34844, AA345992, AI872514, AW848503, BF096090, AL119081, AA412730, W27989, AW249027, AW379952, BF090941, BF096089, AW294156, AW379954, AA613181, BF725485, BF763254, and AL021918.
HWLGN53	1362	907823	1 - 964	15 - 978	BG035685, BF036212, BE742713, AW994510, BG007466, BF507549, AW411084, AA486046, AW578521, AW835293, BF516091, BF130207, AA136605, BF848868, BE896908, BF744854, AU124923, AA516307, F11138, BF842496, BE938679, H15601, BF987872, F11607, BE165978, Z42474, BE930181, AW994051, BE927278, W86355, AA852500, AW964551, BE711186, BE711149, BE711226, BE711156, AW887356, AA148171, AA320600, BE711214, AW887440, AW887446, BF209440, BE714496, AW977275, BE711239, AV735408, BE711222, BE707517, AA423899, BF799195, BE932135, AW370611, AW893707, AW068528, AU118342, AW805779, AA295674, AV656034, AU144929, AW805827, AI885634, AW450872, AA303426, AA094804, AI391670, BE927277, AA062714, AW068313, AI952411, H79980, BF695164, N36443, AW000989, AW411085, BF798200, AI094038, BF902081, AI989656, BE082064, W90311, AB020712, AF139184, AK001014, AX015344, AB018358, AB018359, AF034582, AK002161, AF161393, and AF161452.
HMIAH65	1363	907832	1 - 1078	15 - 1092	AU136724, BE779204, AW851685, BE785846, AV749614, BF365885, and AK001933.
HWAAX38	1364	907899	1 - 532	15 - 546	AI968991, C04062, AV704509, AA255592, BF349408, AI735341, and AA249056.
HTJNG15	1365	908309	1 - 1790	15 - 1804	BG259817, BE268308, BE270476, BE042939, AI571743, BE514280, AV705060, AI422722, BE269234, BE397774, BF525749, AA001424, AI417323, AW118869, BF513373, AW016939, AI809555, AW298455, AA010080, AA047181, AA019642, AA452913, AI147059, AA019812, AA015780, AI028691, BF684837, AI204279, AA047817, AI221342, AA013177, AI094644, BF109069, AI924197, AI934630, AA018716, AA017459, AA015983, AI401304, AA018971, AA017562, AA157438, BG011200, AA021621, AA019376, AA021379, AA056255, AA453081, AI990912, H38930, R75791, AI467993, AA021211, R46277, H40627, AV694312, AA012872, H40674, BE266168, W95949, AW779248, AA016033, AA013143, AA015968, R71551, H85532, AI885549, H86280, R50258, AA054231, H86057, H86832, AA971907, H86597, AA021311, BE142666, AA012904, AA196221, AA059026, AI904546, T06751, AW366897, AA864534, AA019359, W19447, R71497, AA013488, AI669423, AI245102, AA016023, AI951143, N27369, AW956220, H37928, AA019046, AI809842, AA972948, AW576981, AI004979, BE562840, AI383509, AA046456, AA037712, AI247396, AA968612, R75792, H37783, AA019360, R46193, AA021572, AA020806, BE009638, AA057015, and AL079273.
HSDJA72	1366	908338	1 - 2525	15 - 2539	D62424, AA211157, T53618, D62427, AA329581, D62409, and D79516.
HMCHF75	1367	908383	1 - 1461	15 - 1475	BF813971.

HDTAZ43	1368	908412	1 - 1718	15 - 1732	AL537952, AL537247, BG031898, BG028180, BF968394, AL537953, AW269962, BF059389, AI335247, W27670, BE219024, BE220328, BF001690, AI968242, AI566115, AI654235, BF447729, AI292099, AA514672, AI074318, AI078807, AI684358, AW340345, BF000305, AL537248, AI927520, AW470534, W80358, AI971043, AI217656, BE246754, BE247625, BE247708, AW593022, BE772226, BE772229, H18280, W38023, AI366721, W78976, AW044408, BE772234, BF438791, AI027201, BE613515, AI936381, AW771481, BE676460, BE257658, W38024, AI420369, AI400105, AA485265, AW136965, AA634142, AW512515, BE856459, BF436853, BF002384, AA485264, AA007261, AA045262, AI479534, BE772294, AW469806, AA502308, AW135477, AI872996, AW195064, BE889328, AI761037, AI581404, AW445190, AA884366, W25972, AI928527, AI285045, AA971675, AW440060, BE501162, BE676873, BE151560, AI472122, BF475398, AI904882, AW841734, AW674223, H28966, BE966586, AA737030, AW971745, AW877209, AL119443, AL119457, AL119324, AW861944, AL042544, AW804686, AL119399, AW392670, C00169, AL134902, BE695785, AW604723, AL119418, AL119341, AW858526, AW577135, BE705903, BF868697, AW858525, BE705906, AW372827, AL134920, AW384394, AW861889, AW858455, AL119355, AW363220, AL119497, AL119319, AL134536, U46341, Z99396, U46351, BF868684, U46349, AL119483, AL119401, AL119484, AL119363, AL119391, U46350, U46347, U46346, BE705905, AL119444, AL119396, AL119335, AL119464, AL042984, AW604726, BF868687, AL119439, AL042433, AL119522, AL134527, U46345, BE705904, AW861954, AL037205, AL119496, AL042975, AL042450, AL042614, AL134525, AL134538, AI142131, AL042551, AL042965, AL043019, AL042970, AL042542, AL043029, AK026184, AB026436, AR080280, AX030435, AX046357, AJ251859, AR060234, AR054110, AR066494, A81671, AJ279014, and AR069079.
HAAAN55	1369	908451	1 - 1579	15 - 1593	BE275695, BF881986, BE247567, AU130297, AU128451, AI905887, AU130653, BF330599, AL043565, R24991, BF379692, BF380890, BF754617, BF379196, BE250682, BF330601, BF305203, BG002244, BF879736, BF328400, BF330600, BE301899, BE301888, BF826322, AI279874, AK000348, and D43949.
HBODI05	1370	908697	1 - 2494	15 - 2508	AU120941, AU121012, AU120592, AU120417, BE250269, AI126808, BF695058, BF671906, BF672129, BF671000, AW579877, BF671449, BF576332, BF574301, BF670252, BF790531, AW960122, BF791231, BF672754, BF574798, BF305501, AA418414, BF695105, BE156553, BF671961, BF575411, AW579872, BF670857, BF791312, BF671769, BF575478, BF790835, BF671792, BF671456, BF790846, BF672675, BF693805, BE156566, AA192617, BF671448, BF670273, BF672161, BF790545, BF693774, BF575066, AA418529, BF693658, BF672511, BF790297, BF695389, BF693831, BF791322, BF576965, BF671580, AA214096, BF576286,

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HAJAH16	1371	908763	1 - 2651	15 - 2665	AW964117, BF740132, BG105986, BF109791, BF057138, BF196914, BF732879, AW192663, AI813485, BF529931, AI467996, BF732343, AW249671, AI823988, BE504839, BF114628, AI094671, BE858342, BG056192, AI336340, AW245209, BE675501, BE934409, AW957368, AI338167, AI452800, AW516845, AA312449, AI912974, AW136571, BF115245, BF434042, AI761673, AI859055, AI922047, AI151471, BE674600, AW770412, AI871294, AI565644, AI818821, AA858063, AI097651, AI910845, AA767239, AI498921, W56896, AI086438, AA255783, AI744679, AI921953, N38751, BF108724, AI807705, AI339666, BF111511, AI860241, BF516037, AI470016, AW593304, AI261514, AI084861, AI951827, AV721601, AI273326, BF940417, AA456816, BF507665, AI083921, AA026234, AA256005, AA427873, AA975841, AW044122, AI475887, BF111353, AW025647, H30863, AI128881, AA026233, AI312865, AA213700, AI369770, AA028002, H94766, AA193228, AA642716, AA999983, AW516946, AA504815, H38321, AA213665, N48386, AI262677, AI240885, AA350441, R73806, H94734, AI193895, AI864868, AI912007, H38289, AA603355, AI197899, AI372820, AW183825, AI768797, AA377943, AA236636, AW057949, AA350442,

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HOUDS09	1372	908843	1 - 2757	15 - 2771		AU137037, AU139724, AV726797, AI766046, BF690671, BF674420, AW027097, AU154613, AU156994, BF593240, AI675094, AA261857, AU145518, BF590675, AA283057, AI674897, AI805222, AI630208, AW779667, AA282968, AA806859, AA261858, AI143930, AV729051, AA812030, AI640791, AA043782, AA213657, AI126680, AA568974, AA760734, R81901, AA811337, AW075297, R80602, BE247635, R35243, AW470918, R80603, AA579814, AW862052, BF334467, BE696334, AA364260, BG059130, AA282903, R81797, AA736505, BF307232, R35242, T39358, BF205875, AW363736, T39326, T39307, T39316, T39341, T40517, AW891572, AA310137, T40530, R47799, T39334, AW858806, AW470926, AV740446, AV736720, AA713591, T39325, R50432, AI823527, R28674, AV739711, T40515, AA279096, BF332971, T40525, T40518, AW977629, R28533, AI761500, AK024343, and AK023700.
HLWAF59	1373	908860	1 - 1164	15 - 1178		BF571331, BF978217, BE878503, BE465716, BE087241, BF770582, BF904221, BF770577, AA765066, AW904295, R57163, BE082113, BF886035, BE090124, BF431480, AA383435, AW207393, BF842828, BF809745, AI806499, BF919493, AW105563, BF357584, BF880895, AW895015, BF875899, AW104025, and AC008795.
HCFNN18	1374	908915	1 - 544	15 - 558		AI434146, BF974514, AL136370, and AL096747.
HMSCR89	1375	909056	1 - 1817	15 - 1831		AL537236, BE742350, AW957168, AW978202, BE889240, BG114036, BG036215, BG260238, BF968302, BF971204, BF448428, AW070197, AI524194, AW172297, AA573499, BF196911, AW575715, AW170107, BE677830, AI674687, BF669345, AI904073, BE000558, BF434720, BF446056, BF432209, AW369632, AA290723, BG107632, AA731091, AA283710, BF854126, AA047400, N95583, T63128, BE042875, BE889285, AL537235, BF127599, AA694439, BE745186, BE171518, T09374, BF839735, BF732206, BF810523, AA324714, AA379483, AW271726, AA927565, BF529956,

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HDPCW53	1376	909101	1 - 1145	15 - 1159	BF794400, BG036879, AA306977, BE000969, BF352052, AW161063, AB037775, and AB037730.
HTOGI77	1377	909159	1 - 513	15 - 527	BE074857, and AC007676.
HUCOF58	1378	909344	1 - 2923	15 - 2937	AL522376, AL519706, AL531714, AL526798, AL526831, AL525736, AL525802, AL525315, AL525691, AL519707, AL522375, AL525839, BE792809, BE796322, BE743896, BE796567, BE274399, BE796020, BE796664, BE535472, BE260643, BF684007, BF983562, BE543107, BF311070, BG258831, BF528120, BG030916, AV714392, BE889610, BE408007, BE277440, BE618415, BE867723, BG110983, BG181079, BF527074, BF027018, BE264666, BE299203, BE297450, BE264922, BE386448, BF035652, AW410472, BE382754, BE903062, BE407284, BE905907, BG113064, BE298268, BE545526, BG032444, BE266679, AW991399, BE772873, BE884015, AI309611, AW249227, AA442698, AI421417, BF310578, BE312050, BE259606, BF685976, BF970944, BE618656, BE314117, AW248427, AW958233, AI300569, BE564324, BE207989, BE387042, BE261799, AI884919, AW005650, BE061923, AW410704, AW960504, AW601219, BF848073, AI089642, BF342013, AA564704, AL040087, W60773, BE207992, AA903950, AI309614, AI085644, BF347393, AA258978, AI419210, AA009753, BF879231, AA216411, AI865848, BE718378, BF348285, AI683537, AW117839, AI206510, AA453117, AI620366, H58361, BF752057, BF752053, AI520851, AW373946, W42711, AW601221, H42973, AW016488, H08339, F22598, AA494395, AI005664, AI372774, AI565541, H58750, AA778118, AI828095, AI225112, AA576831, BF347545, AA971475, BF352808, AI339860, W42904, BF033582, AI096947, W60487, BF737949, AI243479, AW780312, AI961803, AA706303, AA975280, BF760874, AA449981, AI126822, BF796645, BE410972, BE718404, AW403064, BE890272, W57667, AI096594, AA917878, T16862, H24045, H94211, BF928741, BE831302, R08029, F11443, F09106, H42902, R08078, BE718388, BE718374, Z43495, BE718393, BE718373, BE831316, BE831321, BF846294, AI446598, Z39564, BE718398, AA608866, BE718392, BE831301, AI564884, BE718387, BE718386, H08338, AI245647, AA301909, AW403150, BE718381, BE718412, BE718462, BE718376, BE718450, BE831337, T69855, H80027, BE718396, BE718385, AA135410, BE718469, AI091920, BE718384, BE718433, BE718463, BE718416, BE718439, BE718440, BE831330, BE718406, BE718474, BE718473, BE718461, BE718391, AW247973, BE718428, BE718421, BE718468, AA889882, H24152, AI472790, BE718464, BE718414, BE170203, AW937176, AI567456, T34673, BE718434, AW603147, AW999057, AW768533, BF764766, BE301688, BE718372, BE706857, BE718435, H80028, AI698197, BE718427,

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HAPBL13	1379	909390	1 - 1961	15 - 1975	AL518564, AL519674, AL524125, AL530114, AL518563, BG119582, BE869185, BE734743, AL524124, BG248163, BE736220, BE782619, BF795936, BF033083, BE893350, BF435225, AL519673, BG026633, BF970046, BF692625, BF692541, BE885230, BE393898, BE312030, BE389940, BE892741, BG163906, BE313920, AI241474, AI813813, AI922418, AW631237, AA018345, AW151233, AI420163, BE905414, AW963076, AI922430, W56183, AI671156, AA482598, AW390145, AI018102, AA451942, BE242648, AI419907, AA417581, AA001019, AW473585, BE391031, AA576510, H08477, BF372172, H06603, BF928779, W56260, R69763, AI285366, H07140, R87304, AI357631, AA814595, H06633, AW243905, AI741613, AI762578, BF372164, H43938, AA026966, W22979, BF988194, BE868575, R87305, BF677308, R48432, AI990378, AI459770, H08759, AI949071, AI400794, AW797547, BE550276, T56903, AW750152, AA876261, AA614565, AI000311, AA018346, BF512980, AA450330, AW051437, AA612852, BE076134, AI360869, AI338519, AW613433, AW590872, AI356485, BF992680, AA514688, AA578364, AI696492, AI214800, H89800, AA768838, AI674961, T77366, AI247090, BF811395, AA344443, AV699752, BE833483, AW884714, BE856299, BG152437, AI569050, T56902, R69764, AI623626, BF748071, AA971138, AW367168, AI001995, H52166, AW968355, AA450329, BF003017, AI890057, AI432644, AI623302, AW972092, AI432653, AW081103, AW968356, AI239612, AW972093, AW968729, AA001020, AW858522, AW971740, R48323, R30662, AI432654, AW972091, AI432650, AI431307, AI431316, H89737, BE672759, AW972090, AI431238, AI432677, AW969229, AI432666, AA216315, AI431230, AI431328, AL045327, AW821860, AI431353, AI431312, AI432655, AI431310, AA347637, AW128900, AI431354, AI431323, AL134524, AW953095, AI431321, AI431315, BE833631, AI492519, BF088397, AI431347, BF448552, AI431246, AI432675, AI431243, BE672748, AI432661, AI431337, BE672732, AL042729, AI791349, BE672745, AL047611, AL042655, AI432647, BE672767,

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HHEEN22	1380	909508	1 - 2035	15 - 2049	AL537803, AL533805, AL528779, BE900296, BF115932, BE892972, BF313987, AI361002, AI969720, AL522791, AL537804, BE390684, BF969374, AI805386, BF436604, BF851120, C06251, BF851220, AI304680, AI885442, AI869317, AI306681, AI634959, BG027366, AW962083, AL522792, AA653629, AI336898, AU147422, BF197759, AW192256, AW236693, AI870517, H10595, BE005916, BF056134, R52073, R73296, AI798507, AL038838, AL038983, AA464725, AL037727, AL038532, AI142134, AI927008, AL038822, AL043814, AL043923, AL043845, AL040617, AL044186, AL041238, AL047012, AL041577, AL041459, AL044064, AL040294, AL041635, AL044037, AL047170, AL040463, AL040768, AL046850, AL045753, AL041752, AL045684, AL040625, AL047219, AL040052, AL043570, AL043848, AL041374, AL043627, AL041523, AL041730, AL044074, M78003, AL041602, AL043492, AL040839, AL043677, AL040472, AL043467, AL040510, AL042135, AL040621, AL043538, AL047064, AL040464, AL045671, AL046442, AL046994, AL041133, AL039316, AL041324, AA479858, AL046392, AL040322, AL046914, AL044258, AL044272, AL040119, AL037436, AL041096, AL040444, AL040148, AL045920, AL045817, AL049018, AL041098, AL047057, AL044187, AL040458, AL040576, AL528780, AL044199, AL041955, AL045990, AL041292, AL041358, AL041163, AL040332, AL041142, AL041346, AL041168, AL040529, AL044274, AL040745, AL046330, AL041197, AL040128, AL041159, AL040571, AL037435, AL047036, AL040342, AL042096, AL040553, AL041186, AL044162, AL040285, AL037335, AL039360, AL044165, AL040091, AL040090, AL041131, AL040414, AL041051,

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H2CBH75	1381	909587	1 - 2462	15 - 2476	AF107454, AL525109, BF968132, BG260993, AU125391, BF439992, BF667287, BF666559, BE787193, AW340566, BF980901, BF131428, AA282393, AI635585, BE857014, BF698925, AU145369, BF680887, BF130397, AW953405, AI564770, AA307511, AI094857, AI767771, BF132394, BF669953, BF576213, AI942231, AA037301, BF665081, BE218501, BF680672, T75075, AA400700, W46782, BE618487, AA400655, AW169922, AA307337, AW951664, N28440, AA485147, AA309597, AV722188, AI827798, AU118919, H23497, AW751560, BE972350, AU131474, AI261716, AW753043, AI023953, AA206751, AW438395, AW316878, AI587242, F11062, BE874401, T82820, AW812111, W46783, T82305, F12724, BF374955, N59001, BF332782, Z45760, BF332556, R38518, AA331899, AA296346, AI471180, Z41409, BF879002, BE790376, AI625227, BF969516, F07384, AA485032, F06371, Z43207, AA282051, BE932794, F06352, R13009, AI880884, AI214731, BE618887, H24404, AV706147, AW964541, AV702035, AW966330, AW966389, AW964468, AV705869, AW949645, AI535660, AV707480, AW975618, BE890171, AI535686, AI557751, AV706028, AV706851, AV726812, AV724520, AV704548, C14331, D80045, C14407, AV727418, AW964532, AW973445, D59551, AW973541, AV720791, AV699550, D59859, AV720812, AW960465, AW949586, AW966333, AV718692, AA809122, AV720104, C14344, AA305578, AW966053, AW959627, AV719783, AV720464, AW966041, AW966399, D59275, AV650003, AV718489, AW966059, AW965175, D59317, AW966400, AV720291, AV720150, D52291, AV719632, AV718487, N66429, AK026940, AC005534, AF190665, AK021727, AC007075, AC007097, AX047063, A62298, A82595, AX047064, A84916, AR016808, A62300, AR070327, AR018138, AR071754, AX033851, Z82022, AR087649, AB002449, AB028859, I79511, X64588, AJ132110, AR008278, AR008277, AR008281, AR060385, I14842, AX027925, AR054175, AF058696, AR077702, A63887, and AR060382.
HTLHU05	1382	909665	1 - 1395	15 - 1409	AI827749, BE501922, AI025487, AW662022, AI580407, AI819667, AI223109, AI150036, BF732681, AW087713, AI024234, T18864, AI479322, AA883975, AW341589, AA860213, AI831802, AA913074, AA608857, AI050685, AA860223, AA948538, AI075930, BG037042, BF972639, AW975618, AW966330, AV724520, AW973541,

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HDPPG85	1383	909673	1 - 1750	15 - 1764	BG024946, BF894277, BF925279, BF851282, BF379136, BE244132, AW402742, AA380395, AA354504, AL047399, AI564067, BF795460, BE704219, AL041067, AL041068, and D30758.
HWMIB81	1384	909678	1 - 1167	15 - 1181	AW969424, BE150442, AW952925, AW380440, BF875200, AW299858, BE245899, AW391525, H78659, H78769, H53674, AA628987, AA447173, AW204470, AA343468, BF694134, AA480342, BE150443, BF758197, AK000528, and AF155118.
HSYDI55	1385	909692	1 - 1601	15 - 1615	AL531689, BF975130, BG166578, AV713795, BG256465, AU138732, AU136917, AW188089, BE397937, BE789377, BG169850, BF115624, AI762085, BG178271, BF573578, BF432031, AW273437, BE220494, BF591012, BG171303, BF056174, AW511531, BF195935, AI472328, AW954061, BE500953, AI858271, BE046481, AI440050, BE540278, AI476281, AW304171, AI458243, BE503455, AW956739, AI445711, BE972735, AW136662, BG171279, BF857500, AA164517, AI699703, AA708922, AI268056, H98958, BE813909, AI265884, BE139089, BE503272, AI796023, BF091626, AU156932, T57763, BF222795, AU157726, BF447802, BE220862, AI610309, AI927962, BF205289, AI694704, AW339786, AA971085, AI421319, AA603698, R93782, BG166246, AA465255, N49590, N67740, AI914058, AI190112, AI274909, D20733, BE275478, AW407523, AV682063, AW139929, BE813963, AI217103, AA857052, BE936270, AA827085, AW379725, N49070, AI190529, AA383123, W86964, BE551639, BF439061, H60699, AW615368, BF091557, AW002388, AI341196, AW594520, AI040284, R51650, AA661899, N31773, AA769783, AA812984, AA383124, BF205443, F37231, F24191, BE242063, BE241787, N56201, T60662, T64969, AW664816, AI858737, AA465147, AI420514, BF748531, AI364456, BE207700, AI308213, AI364564, AA984765, AI769568, AW612305, AW996791, BF109474, BE548258, AI638355, AW301000, BF222718, AW610498, AA535238, BE075770, N50200, AI784377, AI569188, T25055, AW996932, AA279845, AW991326, AI699592, BF904839, AA812498, BE814080, AK001954, AF151819, AF257318, AF263364, AB007960, AF263293, AL049597, and AI636746.
HHFJU87	1386	909720	1 - 4093	15 - 4107	AW888219, AU120950, AL529421, AL529422, AL519396, AU132805, AU134243, AU119842, AI056268, BG029323, BG120802, BF980051, BG119518, BG107577, BE867574, BE896064, BE293139, AL519395, AA402681, BG037202, AW769171, AI343372, BF219098, AW961328, BF344227, AW965036, BG179730, AU154263, AI830593, AW997624, BG250141, AI769934, BE296935, BF304496, BF687519, AI828644, AI126507, AA683548, AI973068, AI139495, AI027361, BF062430,

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HDHIB39	1387	909774	1 - 1446	15 - 1460	AL046643, BF062290, AL046644, and AA383293.
HTXSR92	1388	909802	1 - 1347	15 - 1361	BF880998, BF899581, AA320236, AK024488, and AK025091.
HWEAD65	1389	909868	1 - 883	15 - 897	AL519798, BF967338, AI079221, BG120626, AA304143, AW450083, AA781406, BE830104, BE830107, and AC016399.
HUUAR12	1390	909906	1 - 703	15 - 717	AW387096, W32650, AW178917, BF374329, AW387086, AW387109, AW062872, AB018336, and AL122052.
HEMBT61	1391	909941	1 - 451	15 - 465	N86549, AU119707, AW369713, AB002301, and AC008920.
HNTCE17	1392	909957	1 - 853	15 - 867	BE731835, BE900535, AW505346, BE903680, BE895244, BG000781, AL079671, AL079678, BF992762, AW371782, BF753376, AL040960, AK027123, U02313, and AB018350.
HFFAV24	1393	910038	1 - 599	15 - 613	BF984540, AW316850, AA987544, AW956193, AW732633, AA847688, AI061632, BG115584, H29119, BF760396, BE698386, R55898, AI024861, Z17839, AW732945,

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HEOPL36	1394	910057	1 - 2093	15 - 2107	BG032123, AI061632, AW957707, BG119939, BF984540, BG113265, AW316850, AV726623, AW367730, AV726508, AA814516, AW367737, AI754746, BG115584, AA777525, AW367804, BE019677, AW367782, AI097103, BF966784, N30303, AW367773, AW367735, N31888, BE349057, AA847688, AW956193, AA779663, AI923024, AW367809, AA953814, BF432482, AW367777, AW367785, AW404639, AW367237, BF349620, AI827125, AI305265, AI624406, AA582843, N20267, AI292227, AI093328, AA911743, AI684334, AI554543, AA290888, AA503789, AW367806, AW367741, H29119, BE046463, W79584, AW342022, AW338358, AW732633, R55898, AI401634, AW516964, N45284, AI024861, H25738, N31823, AA626619, N42550, AW579526, H17043, H99343, BF432132, AI002168, BE539877, H41983, N33984, AI979180, AI311586, W20290, N78814, BE857138, AW732945, AA564287, AA351508, AA968656, N31566, R75948, H17044, AI372938, BE698386, Z44878, H71114, H60714, H29018, AW367805, AI567783, H53271, AI129803, AA599764, R60811, AI673673, BF760396, T35639, AA158814, AI277345, H60713, H25974, AI423976, R61308, AA582155, T30051, AW579522, AI174537, AI186537, AA705042, M85360, W79783, N29173, R00089, AA161097, N26452, Z17839, F01057, T34112, AI471185, AI023664, N54731, BE172434, BG252507, W31954, AW130265, AW806695, BG166140, T33806, BE708528, H41935, R59766, AA826327, AI244584, N90670, AI202016, AI077600, AW009848, R76786, BG231512, AA987544, AW579524, AW629333, BF927316, N24540, AI432312, AA777544, R09698, AW081089, BF762595, BE221053, T31022, BE207808, BE206709, AI468541, AW089365, Z40650, BE242528, AI217229, AI371184, T77157, Z28806, AA069041, AA505841, BF820293, AI220752, N42027, N42580, AI497869, AA346958, AA160430, T32679, R09699, R55813, BF762602, AI400851, AA298583, AI919072, T33966, BF690173, BF742147, AA159592, AW196132, AA743892, AI689177, BF945478, W31331, BE001277, T34006, AA911196, AW371882, AA301187, BF799470, BF927205, AW367265, AI217099, AA856916, BF799542, BE064322, AA879055, BE179212, BE815874, BF948988, AV693700, AL389984, AF128536, AY007086, AF116648, AL049758, AF128535, AF139495, AF139493, AF139494, AF139492, and AR030257.
HFKJM30	1395	910061	1 - 1170	15 - 1184	AA075233, BE539371, AA306831, BF361796, AW893975, AW993209, N34160, AI750882, and Z21161.
HTEPE35	1396	910083	1 - 825	15 - 839	AI935040, AA861064, AA933697, AA707583, AA872105, AA398866, AA609626,

					AA620685, AA435866, AA812556, AA781805, AA993718, AF012362, AI217888, and AA824315.
HIBEG14	1397	910301	1 - 1003	15 - 1017	BF309769, BF569808, BE299199, BF307790, BE294022, BF307280, BE889392, BF204619, BF315984, BE875943, AW499957, BF569796, AW328048, AW957614, BF316139, AL046819, AA099341, AA446798, AW608269, BF229954, H17847, BG252791, BF809120, BE889170, H43800, W22008, AA034999, W23302, BF737282, BE169287, BF315702, AW293778, BF809986, BF745886, AW956176, H45902, AA351298, BG122527, BF727340, BE871070, Z43942, BE260511, BE825192, AW608295, BF309836, H91434, BE707279, BE742991, BF805060, AA373993, BF881708, BF805243, BE772341, BE728129, BF124933, AI376959, AA205761, BF855456, BF856294, BG105523, BF808170, BE746582, BF759250, BE931592, BE931589, BF997335, H45894, BF725034, AA314509, BF736820, BF805273, BF915876, BF914573, AA348786, BF374343, AW898502, BE185512, AK025330, AK024916, AF068755, D87435, AK025153, AL121928, and AF127523.
HIBCH43	1398	910448	1 - 2156	15 - 2170	AL538373, AI131052, AW961956, BF515998, BF681676, AA523426, AI889021, AA878208, N48374, AA633585, AW073599, AA937104, N38737, W02862, AI004340, N41485, AW005782, AW450150, N73459, AA496267, AI310433, BF955180, AI393818, AI357494, AI491761, AL538374, N29461, BE049328, AW517294, D54111, H00339, AW903429, AA810049, BF448763, AA410656, AA864514, AA255630, AA349755, AA338630, R15175, AL535774, R60777, T40978, D81723, H17893, AV749211, AA339554, R41626, BF961532, R50877, T61269, Z42650, R20169, BF947870, R44956, H00299, T05199, T61321, Z38812, H05253, T40055, H84304, T08208, T24545, R50757, AI459735, AV722174, T31283, AW401402, AI861965, R60267, T06066, AI657485, N83963, N87188, N83707, T08351, AB040905, AK000373, U39066, AR018815, AX009614, AF045432, AJ243486, U48697, U48696, AX009612, AF102850, AF011573, AF001863, AF061744, AR091393, X99058, X99056, X99052, Y16299, X99051, X99055, X99060, AX015225, X99057, and Y07542.
HELDY60	1399	910451	1 - 617	15 - 631	AV647669, AV647418, D81111, D80064, C14227, AW966013, C06015, T11417, C14407, AW959582, D80253, AW177440, AV718489, AW966075, AW966065, C14389, AW959136, AW966032, C14298, D80366, AW978634, AW966059, D51079, D80227, AW975618, AV719557, D59859, AV722801, AW978661, AW966053, AW959799, D57483, AW960553, AW753053, D80269, D80168, AW966043, D58246, AI557751, AW958993, AV718692, AW975613, AV699447, AW960473, D80188, D51423, AV699480, AW966029, AV700889, D59889, AW973334, AW966534, AW973474, D81030, AW959597, AW960465, AW965163, AW973307, AW966030, AW966531, D80166, D58101, AV720878, AW966022, D59503, F13647, AW178893, D59619, AW752082, D58283, D80210, D51799, AW960532, D80043, D80240, AV719822,

					AW978648, AW966041, AV719324, AV718938, AV718633, D80212, AW975605, D80022, C14331, AV718707, D80024, AW973488, D80195, T03269, AV720211, AV718931, C15076, D59610, AV720731, AW975621, D59275, D59467, AV719468, AV718800, AV723927, D80219, D80949, AW352117, D80391, D80164, AV699746, AW973541, AW949656, AV720791, AV718440, AV720028, AW966054, AV720203, AW949642, AW964756, AW966050, AV719188, D59787, AW966062, AV719783, D59502, AI557774, AW959628, D80378, AW959062, AW965177, AW959202, AW959570, AW965185, AW965197, AW975623, AW965196, AW973485, AW965184, AW965175, D80196, AV718844, AV720464, AV718770, AW949630, AW973482, AW964488, AW949641, AW958992, D80014, AW949645, AW973330, D59695, AA305409, D52291, AW753067, AV724520, AV699927, AW964477, AW956434, D59927, AV699550, AW949657, AW962082, AW959469, AW949654, AW964737, AW369651, D80038, D51022, D50979, AW960454, AW966023, AW956397, D80193, AV720533, AA514184, AW949629, AW962245, AW949653, D80241, AW949631, AW949643, AW949618, D50995, AW949655, AW973447, D80258, AV721386, AV719000, AW965158, AW949633, AW176467, AW965176, AV720220, AW949646, AW949632, AW949658, AV740249, AA305578, AW973490, C14429, AW960570, AV720812, D80045, AW360811, AV723097, Z21582, AW179328, AW960504, AV699479, AW960564, AV743654, AV740535, AV741888, C75259, AV701004, D80251, D51231, AW375405, AW973326, C14014, AV700357, AW964468, AV700895, AV700229, AV720654, BF349354, AV699411, AV737584, AV699715, AV718908, AV744690, AW360817, AV742001, AV742667, AW366296, AW360844, AV701125, AW753051, AW962395, AV701335, AV701166, AV742430, AV701149, AL133553, AR092424, A62298, AR018138, AX027925, A62300, A84916, AX033851, AJ132110, AR070327, AX047063, AX047064, AR008278, AR087649, AR016808, AF058696, AX021518, AR077702, X68127, AR054175, AX028130, Y17188, AB028859, D26022, AX020191, X67155, A67220, D89785, AX035434, A78862, D34614, AJ302649, A25909, AX020190, AR008277, AR008281, AX047062, AB002449, D88547, A82595, AR060385, Y12724, I14842, I50126, I50132, I50128, I50133, X64588, AR091537, A70867, AR062872, A94995, AR016514, Y17187, AR060138, A45456, AR074139, A26615, AR052274, A43192, A63261, A43190, AR038669, A64136, A68321, AR066488, Y09669, AR066487, AR074136, I79511, A30438, AR093385, AR008443, AF123263, AR016691, AR016690, U46128, AR032065, D50010, AR008408, AB039880, and AR060133.
HDPRX11	1400	910465	1 - 1630	15 - 1644	AL528502, AL529630, BE615772, BF983242, BF981395, BE615323, AA425584, BG249631, BF376733, AA393897, BF376149, BF306303, AW957715, AA421197, BF763508, AA351794, AI365582, BF875897, BF875898, BF036884, AA130400, F06747, BE900781, T07026, AA351666, BF366501, AW176346, BE274021, BG033008.

					BF310904, AA068987, BF887110, BF125045, BE294287, BE297092, BF983414, BF841405, BF823445, AK024427, and AF174603.
HDPBN81	1401	910569	1 - 2853	15 - 2867	AU141855, BG254423, BF689928, AW976725, AU136431, AI801897, BF940288, BF732920, BF690154, BF433303, BF195711, AW517339, BE670695, AW467012, AW205776, BF436096, BE247412, BF058747, BF690051, BF689977, AI754077, AI126236, AA994465, N29128, AW303365, AI305201, AI373010, BF594605, AI633879, AA741232, BE466577, BF724464, W44731, BE243897, AI951557, AI268256, AI738529, AI870136, N28029, AI379201, AI761741, AI766228, AA281348, N35179, AA236416, AA768829, AI568382, AI218917, AW337445, AU157004, W38665, H20025, AI160887, BF835485, AU156719, W92895, AI911791, BE244852, AA461295, AW028731, AI433473, H20101, AA815110, BE244807, AI126953, AI351875, AI912253, AW339938, N23395, AA236417, BE222371, AA459710, AW404548, H51393, H49128, BF082381, AW168488, W92818, AI433222, N26729, AA995639, AW138449, N21167, AW207011, BE669624, N34617, BE247011, H50404, AA304033, BF445330, AI692390, AA996188, H99578, AI912577, N21284, H50364, BF872901, AA281349, AI917007, N24224, BE041496, AA357145, AW298198, H51392, AA931978, AA992494, AI005428, BE551312, H21490, H40615, H49060, H27879, AA814328, T12251, AA994344, BE858052, AI205488, T71250, AI917712, H99192, N24475, AW751629, T90814, AA121981, AA121980, T12252, AW751630, AI526078, AV707705, AV705143, AW958106, AW958109, AV705282, Z32887, AW955629, AV706136, AX023769, AF129112, AX019706, AF103906, A94121, AK001896, AX019710, AX019708, AB021665, AF129113, AB029330, and AB022332.
HSLJF08	1402	910686	1 - 799	15 - 813	AL526578, AL517776, BE410566, BE387490, BE378857, AL528093, BF724735, BF984478, BE387459, BE542847, BF305064, BF310629, BE262161, BE391955, BE261272, BE261001, BE302471, BE881458, BE798741, BG178982, BF970835, BE563381, BF851555, AA805310, BF975927, BE018938, BE904955, AA381563, AW883712, AA382642, N42584, AA323574, N31176, BG015922, BG015845, BE273985, AC004126, and AB013721.
HAGAE60	1403	910706	1 - 538	15 - 552	AA453141, Z43057, and AF169693.
HTJNI49	1404	910714	1 - 2408	15 - 2422	BF528573, BF966889, BF347124, BF347254, BF527132, BF345915, AI912956, AW005421, AI479888, AI968200, AW051673, BF059512, BF347881, BG056489, AW195692, AA191496, BF508416, AW241557, BE047005, BE502060, BF507946, BE219510, BF437865, AI636555, AI631197, AW268478, AW952293, AV729301, AW297035, AW007504, BF057679, AI817722, AI394250, AW594614, BE765755, AI277737, AI339955, AI394531, AW023543, AA081920, BF934850, AI094744, N47888, BF332929, BF948205, D60233, AW952296, AA453034, AV706502, AA190320, H39689, AI640463, N51145, D60232, BE694035, R36774, BF366736, BE328102, BF837280,

						AI693121, D61426, R24709, AI560458, BE467598, T80514, AW770728, AA321164, AI689851, AI468746, AI161192, R12231, AI203048, AW020660, AA326701, R39949, H28681, R45443, AA321911, H14710, AI459741, AW022696, BE762694, AA370485, E15003, AL137311, AC007748, AC008273, and AC007559.
HUFBA64	1405	910722	1 - 1502	15 - 1516		AV699352, AI640262, AI691066, BE465442, AI215163, AI762251, AW449055, AI867211, AI640454, AI222536, AI22484, AW937129, AA911069, AA910552, AV689858, AV696520, AA994834, AV695257, AI948684, AI762130, AW873454, AW821862, AI942346, AW860126, N64302, AW821865, N58101, BE071153, AW881517, AW862343, BF741462, BE825240, AK000384, AF258676, AF301909, AF276242, AK000226, AK025012, AF258674, AF277159, and AF258675.
HMTAX31	1406	910866	1 - 1173	15 - 1187		BE868556, AV714942, BE910217, AV764304, AW188661, AW963729, AA406582, AA847680, AW167272, AW151243, N25994, AA621715, AI015551, AW513605, AI829183, AI290229, AA410486, AA815315, AI040507, AI818989, AI040765, AI636434, AW167634, AI085194, AI342313, AA406387, AA827049, AA812382, AA769207, AI278749, R60575, AA983613, AV711945, N36626, AV764531, AI283824, AI128463, AA374753, AA911296, AA484968, AA463739, T30540, T53444, AI126964, AA411633, R70442, AA256096, AI655254, AA410304, R37051, AA872115, AA528102, AW385663, AA625487, AA985260, AA411672, AA411671, AA988584, AA284022, H42417, D20266, BE796998, AI916438, AA345748, R69455, H42445, BF432193, AI753452, BF872302, AL079839, BE185223, H82446, AA285169, BE890604, BE774954, AF165519, and AK000383.
HSSAL39	1407	910902	1 - 453	15 - 467		AA377965.
HE8QR01	1408	911011	1 - 1186	15 - 1200		AI971394, AI871742, AA434160, AI139742, AI634480, BF448386, BE670299, AA984007, AI267902, BE218554, AI634496, AI924610, AI632967, AW137060, AI700714, AI339943, AI032179, BE217731, H23429, AA934393, AA033815, AW366943, AX006320, AF188608, M89797, AL031281, AX006322, U25141, and U51267.
HLDQK77	1409	911038	1 - 2870	15 - 2884		AW385785, AW580852, AA430300, AA541688, AA776700, AA679037, AW956718, AW664335, AA573270, AA126614, AL045796, BF435548, AI268236, AA682186, AI963606, AI926591, AW192904, AI924827, AI922590, BF516156, AI032288, AI375804, AA705172, AW081541, AW602610, AA694514, AI130883, AI800450, AA931725, N25288, AI270687, AI366906, AW058362, AI683319, AA436891, BE049444, R59176, AI597744, AI446542, BF928886, W69578, AW453004, AI911821, AI095665, AA687634, AI130013, W69579, R59232, AA722782, AI587015, AI191864, AA398533, AA676733, AI476374, AA115447, AA554327, AA759328, BF743669, AW875443, AW242281, AI139766, AA042956, AA886732, AA664356, AA358590, AA135916, AI565897, AW304844, AA916086, AA618576, R66162, H71919, AA363371, AA430199, AI370031, BF445642, Z44808, AA320329, AI934183, AA393105, AI004140, AA135927, AA042816,

				AW452852, AA135926, H44791, AA813424, AI865731, T35731, R42647, R27785, T32691, AI857286, AW008428, BE857998, AI631988, AA115446, AA678468, AW075384, AI569918, H44790, AI918635, BF092378, AA601518, AA603858, BF092542, H42641, AI745618, AI445766, BF885342, R27874, AI939990, BE926745, AA677131, AW364938, AI569374, AW836479, AW955686, AV726156, AW029062, AV703593, AW959998, BF885678, AW952182, AV708834, AV705159, AV684604, AV695545, AV704234, AV693523, AV707753, AV703362, AV655280, AV703495, AV727799, AV702026, AV725134, AV728670, AV702147, AV690007, AV702117, AV726738, AV651955, AV652001, AV704553, AV656478, AV709314, AV701067, AV691080, AV701707, AV656903, AV728733, AW961253, AV686060, AV709660, AV706721, AV729220, AV687035, AV696866, AV656283, AV708025, AV708980, AV692691, AV708992, AV727029, C01947, AV654896, AV652617, AV645906, AV709869, AV683272, AV686346, AV698043, AV727819, AV728806, AW945168, AV660608, AV725617, AV703372, AV701983, AV708004, AV652027, AV728270, AV727787, AV728997, AV698609, AV727003, AV708704, AV728471, AV706677, AV727526, AV703472, AV661704, AV697196, AV726816, AV696931, AV699089, AV692345, AV659322, AV654035, AV708893, AV708381, AV660728, AV656256, AV698429, AV725920, AV692972, AV729378, AV703168, AV708438, AV705384, AV703169, AV728518, AV652156, AV708723, AV652443, AV727980, AW960720, AW954384, AV709604, AV707933, AV701914, AV704269, AV652167, AV702516, AV659389, AV726103, AV701498, AV725826, AV702021, AW959800, AV705280, AV659294, AV727238, AV704637, AW950247, AV698545, AW954031, AV654908, AV702345, AI249902, AL391319, AI249901, AL109940, AL442124, S68736, AL050277, AK025967, AF118094, AF232009, AK024992, I48978, AL133072, AR011880, AF254119, AF130066, AK026762, AL122110, AF130082, AL137550, Z97214, AF182215, AF119899, AK025435, I89947, AL122093, AF218031, AX019230, AF126247, AL133640, A91160, AF146568, AK026959, AL133080, AX019229, AB034701, A93016, AL049382, AR029490, A08916, A08913, AL389935, I48979, AF100781, AL162083, AF130105, AL162062, Y10655, AF113694, AK026593, AF177401, AL137479, AK025209, AF207750, AK024588, X56039, AK026434, AR034821, AL050393, S61953, X82434, AK024538, Y11254, AF079763, AK025092, AF159615, AL050149, AL096744, A08910, A08909, A77033, A77035, AF119865, Z82022, AB048954, AL137294, AL117460, AL359615, U35846, AF116682, AL389982, AK024524, AF113019, AF116688, AF114170, AK027096, AL050024, AF177336, AL137459, AK000323, AL080126, AF130110, A65341, I03321, AK025708, AK000432, AF056191, AJ005690, AF116631, AF090934, Y11587, I33392, AK026744, AL133075, I68732, AK026649, X63410, I89931, X79812, AL389978, M27260, AB052200, AK025524, AK000486, I00734, AR087170,

					AK027146, E00617, E00717, E00778, AL353940, E01614, E13364, A76335, AB007812, AX006092, AK026592, AL117435, A03736, AF057300, AF057299, X72889, AL359941, AK025407, AK025632, AF116602, AK026506, AF138861, AF139986, A57389, AL122049, AL359622, A07588, AF067728, AX042059, AF091084, AB047941, AF111851, AF116654, AF183393, AK027164, AL110221, AF090900, AL137548, AK026542, AL162004, A18777, AL049283, AL137560, X70685, AL353957, AL359596, AK025084, AL133557, AB047904, AX020124, AF090903, S78214, D83032, AF017437, Y16645, AF119875, AK000137, AK000083, AF090886, AK026927, I66342, AF260566, AF208850, AK024546, AF104032, AR068751, U88966, AR038854, AK026534, AF065135, AF087943, AL359583, AF116609, AL110197, AF116646, AL359601, AL133016, I09499, AL133113, AX026824, AX026823, A58524, A58523, AK024594, AF116691, AK027121, AL122050, AL049430, AK026642, AF113699, AL137271, E02349, I92592, AF026124, A08912, X65873, AL122121, AL389939, AJ012755, AL137463, X81464, AF028823, AF130055, A08908, AL390154, AF069506, AK026741, AL122100, AF242189, AL137533, AF079765, AL137521, AF008439, AF130059, AL162002, AL117457, AK000618, AB049849, AL133558, AB047887, AK026583, AB047623, AK026045, AB052191, AF217987, AF017152, M96857, AF130099, AF130075, AL157482, U80742, and AF090901.
HTXDX21	1410	911129	1 - 1280	15 - 1294	AL532995, AL535124, AL530055, AL519514, AL537312, AL528319, AL533352, AL529134, BF568175, BE741905, BG034104, BE547352, BE274622, BE731333, BF797010, BF306620, BF313124, BE275949, BE782406, BF338397, BE892479, BF203819, BF316551, BF310719, BF307040, BE384333, BE792462, BE383396, BE903632, BF689654, BE907819, BE736356, BE902781, AL528318, BE295219, AW385210, BE270419, AW952767, BG178860, BE311434, BF339641, BE298827, AW580494, BE796299, AL537859, AA203288, BF970396, AW248202, BE789240, AV658200, AW381812, BE152139, AW381820, BE152125, BF839907, BF876381, BF870245, AW381788, AW606103, BF872594, BE879361, H08032, R59408, AA251711, AL519513, AW391962, H38466, AW392072, AW675189, BE812161, AL529133, T08885, BF820870, Z45125, AW607111, BF929671, AA284122, R55922, R71422, AA132573, AA338727, BE394425, T19067, R19873, AA380273, AA306741, AW606114, H20224, BF956569, T32135, BF690553, BF722598, H14335, BE089898, BE936323, R71855, AA349258, AV750136, AA292979, BE838786, AA453179, BF897605, AW392152, R61099, T30961, BE792196, R48687, AA017424, AA339088, BF921563, D60752, AL047640, BF839916, R81429, AA434198, F07759, BF568898, AA043907, BF090429, H21242, H20698, H19959, N45020, AA078592, H46841, H85906, AW581682, H18360, AA017593, AI907987, AW247172, AA131344, D79023, AW888925, AW605244, AA477846, AA302385, BF351770, D52938, AV705566, AV706886, AV707687,

					BE621920, AA404213, AW391963, W39054, AW803820, D56251, W60672, AA308717, W60671, BF955063, BE350704, AA321261, AA069353, AA523404, W93904, AA843927, AA410846, AA984067, AA477522, BF847878, BF925418, AK026590, AF226732, and AC005067.
HMSHP51	1411	911153	1 - 1486	15 - 1500	BE903295, BG254805, BF794000, BF968496, BE272169, BG260638, AL120746, AL522917, BE543592, BE297251, BF529609, BE720216, BE720217, BF341980, BE244419, AL120747, BE245182, AW117671, AW300899, BE244953, BE243858, BF895795, AI652660, BF929240, AW629889, BE246315, AA569672, AA569649, AA244194, BE221131, BE242172, R35109, AA324440, AA339557, AW613411, AW796843, AI203708, AW167744, AA436513, AA778267, BE246596, W79935, AI056797, AW572079, BF833240, AW057743, AI582819, AA677278, AA131340, BE242875, N78637, AI096486, AI609750, AW074046, AI208439, BE246782, W78110, AA716407, AI084144, W27763, BE244169, AA490824, AI753217, BE044814, AA334708, F24526, AI423068, AI139883, AA723727, AI886757, AA626327, AA251510, AI032915, R13997, AA642228, AI869581, AA740620, AW079414, AI004337, BF928163, AI656957, AI864899, AI682403, C00729, AA431957, BE242652, BF588823, F25694, AW732243, AA447589, AA468903, AA129460, BE243424, BF592584, AA719083, BF591758, T35337, T03781, BF342042, AI038540, BF851699, BF197941, R49497, BE242812, AA448088, AW139526, BF913014, BE246926, AA244268, BG149257, BF913018, AW969318, AA251639, AA002030, AA719165, BG230523, AW798250, AW893238, AA399600, and AF151845.
HJPBB56	1412	778816	1 - 508	15 - 522	AI803011, W44759, AA046886, BE674240, AI831233, AI302073, AW340759, AW236130, AI093394, AI935787, BE504265, BE504248, AW589954, AA150960, AW466913, AU146133, AI973084, BF196728, AA936951, BF446143, AI418623, AI435580, AW956422, AI264581, AI671022, AU146787, AW118839, AW665544, AI191597, BE645619, AI675809, AI242558, AW088730, AI800707, AA046979, AW296225, W73928, AA421100, N70304, AU150654, AA031539, AI564140, BF477497, AW265034, AW235148, BE535837, AA243847, AA084054, AI273243, AA226593, BE044190, AL526528, AW294446, AA421099, AA422134, AL521295, BF966843, AI433141, T50069, AI276055, AI097360, AW663063, F32723, AI814125, H28027, AL526867, AA652326, AI797634, AW589926, AI168830, AI650824, AA496314, AI971370, AI150958, AW614139, AW305179, AA233111, BE908703, R24074, AW236726, AI302409, AW612139, H77423, AI298574, D59998, AI077484, AI969750, W04250, AL520535, AW875716, AA226401, BE044224, BF476540, AA770396, AW601638, R31691, H78541, AA340545, AL532967, AA122285, H79028, AW614495, H54014, AA026139, D60652, D60653, R15482, H05830, AA689289, AA629153, AW384798, AV651502, AW589213, BF695131, H39508, R24127, AW192348,

						AW296783, BE076193, W79047, BF966894, AA033515, AA081773, AI696661, AA766234, AV727476, AL525396, AA913310, AW384825, BE545123, AA084053, BF932613, AW995404, AK021925, AK000480, and AK022780.
HPWAS05	1413	843051	1 - 678	15 - 692		AW578499, AW578486, AW578466, AW962801, AW853617, AW853484, AA355417, H50788, AW604417, AW578516, BE769873, BF742693, BF944347, BF085020, BF376802, BE938438, AW510783, AW404210, AU148184, AA676210, AW361374, AL117348, AB018335, AK022502, and AK022465.
HUSIC81	1414	886711	1 - 1056	15 - 1070		BG252894, BG252656, BE905485, BG114831, BG249923, BF986308, AL048954, BF105260, BF382321, BE872774, BE541890, BF697715, BF984881, AA457625, BF815719, BF755168, AW860753, AW993684, AV708152, BE867752, AA557778, BF802746, BF664978, BE938703, AA044378, Z24930, BF887305, BF084350, BF037687, BE933732, AV696527, AA296931, Z32781, R78864, R37535, BF815237, AV695738, AW993023, AW974216, N31845, BE696398, BE620095, T31498, AA579908, AW974217, BF799275, AW366456, AA437015, BF815345, AV748930, BF132467, BF802748, AW366514, AW860733, AW860769, BF733961, BE932064, BE086739, BF210190, T36185, BF029928, BE932056, AV713753, AW958924, BE768063, AW606977, AW993306, BF986296, AW364905, BE719765, BE932712, BF741954, BE932705, AW407667, H12700, H03274, BG179582, BE173827, BE002433, AF269150, A91337, AF116347, AK000756, AF160213, AF269151, A78983, and A78984.
HUCPE29	1415	897919	1 - 1205	15 - 1219		BF109175, and AI932636.

TABLE 4

Code	Description	Tissue	Organ	Cell Line	Disease	Vector
AR022	a_Heart	a_Heart				
AR023	a_Liver	a_Liver				
AR024	a_mammary gland	a_mammary gland				
AR025	a_Prostate	a_Prostate				
AR026	a_small intestine	a_small intestine				
AR027	a_Stomach	a_Stomach				
AR028	Blood B cells	Blood B cells				
AR029	Blood B cells activated	Blood B cells activated				
AR030	Blood B cells resting	Blood B cells resting				
AR031	Blood T cells activated	Blood T cells activated				
AR032	Blood T cells resting	Blood T cells resting				
AR033	brain	brain				
AR034	breast	breast				
AR035	breast cancer	breast cancer				
AR036	Cell Line CAOV3	Cell Line CAOV3				
AR037	cell line PA-1	cell line PA-1				
AR038	cell line transformed	cell line transformed				
AR039	colon	colon				
AR040	colon (9808co65R)	colon (9808co65R)				
AR041	colon (9809co15)	colon (9809co15)				
AR042	colon cancer	colon cancer				
AR043	colon cancer (9808co64R)	colon cancer (9808co64R)				
AR044	colon cancer 9809co14	colon cancer 9809co14				
AR045	corn clone 5	corn clone 5				
AR046	corn clone 6	corn clone 6				
AR047	corn clone2	corn clone2				
AR048	corn clone3	corn clone3				
AR049	Corn Clone4	Corn Clone4				
AR050	Donor II B Cells 24hrs	Donor II B Cells 24hrs				
AR051	Donor II B Cells 72hrs	Donor II B Cells 72hrs				
AR052	Donor II B-Cells 24 hrs.	Donor II B-Cells 24 hrs.				
AR053	Donor II B-Cells 72hrs	Donor II B-Cells 72hrs				
AR054	Donor II Resting B Cells	Donor II Resting B Cells				
AR055	Heart	Heart				
AR056	Human Lung (clonetech)	Human Lung (clonetech)				
AR057	Human Mammary (clontech)	Human Mammary (clontech)				
AR058	Human Thymus (clonetech)	Human Thymus (clonetech)				
AR059	Jurkat (unstimulated)	Jurkat (unstimulated)				
AR060	Kidney	Kidney				
AR061	Liver	Liver				
AR062	Liver (Clontech)	Liver (Clontech)				
AR063	Lymphocytes chronic lymphocytic leukaemia	Lymphocytes chronic lymphocytic leukaemia				

AR064	Lymphocytes diffuse large B cell lymphoma	Lymphocytes diffuse large B cell lymphoma				
AR065	Lymphocytes follicular lymphoma	Lymphocytes follicular lymphoma				
AR066	normal breast	normal breast				
AR067	Normal Ovarian (4004901)	Normal Ovarian (4004901)				
AR068	Normal Ovary 9508G045	Normal Ovary 9508G045				
AR069	Normal Ovary 9701G208	Normal Ovary 9701G208				
AR070	Normal Ovary 9806G005	Normal Ovary 9806G005				
AR071	Ovarian Cancer	Ovarian Cancer				
AR072	Ovarian Cancer (9702G001)	Ovarian Cancer (9702G001)				
AR073	Ovarian Cancer (9707G029)	Ovarian Cancer (9707G029)				
AR074	Ovarian Cancer (9804G011)	Ovarian Cancer (9804G011)				
AR075	Ovarian Cancer (9806G019)	Ovarian Cancer (9806G019)				
AR076	Ovarian Cancer (9807G017)	Ovarian Cancer (9807G017)				
AR077	Ovarian Cancer (9809G001)	Ovarian Cancer (9809G001)				
AR078	ovarian cancer 15799	ovarian cancer 15799				
AR079	Ovarian Cancer 17717AID	Ovarian Cancer 17717AID				
AR080	Ovarian Cancer 4004664B1	Ovarian Cancer 4004664B1				
AR081	Ovarian Cancer 4005315A1	Ovarian Cancer 4005315A1				
AR082	ovarian cancer 94127303	ovarian cancer 94127303				
AR083	Ovarian Cancer 96069304	Ovarian Cancer 96069304				
AR084	Ovarian Cancer 9707G029	Ovarian Cancer 9707G029				
AR085	Ovarian Cancer 9807G045	Ovarian Cancer 9807G045				
AR086	ovarian cancer 9809G001	ovarian cancer 9809G001				
AR087	Ovarian Cancer 9905C032RC	Ovarian Cancer 9905C032RC				
AR088	Ovarian cancer 9907 C00 3rd	Ovarian cancer 9907 C00 3rd				
AR089	Prostate	Prostate				
AR090	Prostate (clonetech)	Prostate (clonetech)				
AR091	prostate cancer	prostate cancer				
AR092	prostate cancer #15176	prostate cancer #15176				
AR093	prostate cancer #15509	prostate cancer #15509				
AR094	prostate cancer #15673	prostate cancer #15673				
AR095	Small Intestine (Clontech)	Small Intestine (Clontech)				
AR096	Spleen	Spleen				
AR097	Thymus T cells activated	Thymus T cells activated				

AR098	Thymus T cells resting	Thymus T cells resting				
AR099	Tonsil	Tonsil				
AR100	Tonsil geminal center centroblast	Tonsil geminal center centroblast				
AR101	Tonsil germinal center B cell	Tonsil germinal center B cell				
AR102	Tonsil lymph node	Tonsil lymph node				
AR103	Tonsil memory B cell	Tonsil memory B cell				
AR104	Whole Brain	Whole Brain				
AR105	Xenograft ES-2	Xenograft ES-2				
AR106	Xenograft SW626	Xenograft SW626				
H0002	Human Adult Heart	Human Adult Heart	Heart			Uni-ZAP XR
H0003	Human Adult Liver	Human Adult Liver	Liver			Uni-ZAP XR
H0004	Human Adult Spleen	Human Adult Spleen	Spleen			Uni-ZAP XR
H0006	Human Frontal Lobe of Brain					Uni-ZAP XR
H0007	Human Cerebellum	Human Cerebellum	Brain			Uni-ZAP XR
H0008	Whole 6 Week Old Embryo					Uni-ZAP XR
H0009	Human Fetal Brain					Uni-ZAP XR
H0011	Human Fetal Kidney	Human Fetal Kidney	Kidney			Uni-ZAP XR
H0012	Human Fetal Kidney	Human Fetal Kidney	Kidney			Uni-ZAP XR
H0013	Human 8 Week Whole Embryo	Human 8 Week Old Embryo	Embryo			Uni-ZAP XR
H0014	Human Gall Bladder	Human Gall Bladder	Gall Bladder			Uni-ZAP XR
H0015	Human Gall Bladder, fraction II	Human Gall Bladder	Gall Bladder			Uni-ZAP XR
H0016	Human Greater Omentum	Human Greater Omentum	peritoneum			Uni-ZAP XR
H0017	Human Greater Omentum	Human Greater Omentum	peritoneum			Uni-ZAP XR
H0018	Human Greater Omentum, fII remake	Human Greater Omentum	peritoneum			Uni-ZAP XR
H0020	Human Hippocampus	Human Hippocampus	Brain			Uni-ZAP XR
H0021	Human Infant Adrenal Gland	Human Infant Adrenal Gland	Adrenal gland			Uni-ZAP XR
H0022	Jurkat Cells	Jurkat T-Cell Line				Lambda ZAP II
H0023	Human Fetal Lung					Uni-ZAP XR
H0024	Human Fetal Lung III	Human Fetal Lung	Lung			Uni-ZAP XR
H0026	Namalwa Cells	Namalwa B-Cell Line, EBV immortalized				Lambda ZAP II
H0028	Human Old Ovary	Human Old Ovary	Ovary			pBluescript
H0029	Human Pancreas	Human Pancreas	Pancreas			Uni-ZAP XR
H0030	Human Placenta					Uni-ZAP XR
H0031	Human Placenta	Human Placenta	Placenta			Uni-ZAP XR
H0032	Human Prostate	Human Prostate	Prostate			Uni-ZAP XR
H0033	Human Pituitary	Human Pituitary				Uni-ZAP XR
H0036	Human Adult Small Intestine	Human Adult Small Intestine	Small Int.			Uni-ZAP XR
H0037	Human Adult Small Intestine	Human Adult Small Intestine	Small Int.			pBluescript
H0038	Human Testes	Human Testes	Testis			Uni-ZAP XR
H0039	Human Pancreas Tumor	Human Pancreas Tumor	Pancreas		disease	Uni-ZAP XR
H0040	Human Testes Tumor	Human Testes Tumor	Testis		disease	Uni-ZAP XR

H0041	Human Fetal Bone	Human Fetal Bone	Bone			Uni-ZAP XR
H0042	Human Adult Pulmonary	Human Adult Pulmonary	Lung			Uni-ZAP XR
H0044	Human Cornea	Human Cornea	eye			Uni-ZAP XR
H0045	Human Esophagus, Cancer	Human Esophagus, cancer	Esophagus		disease	Uni-ZAP XR
H0046	Human Endometrial Tumor	Human Endometrial Tumor	Uterus		disease	Uni-ZAP XR
H0047	Human Fetal Liver	Human Fetal Liver	Liver			Uni-ZAP XR
H0048	Human Pineal Gland	Human Pineal Gland				Uni-ZAP XR
H0049	Human Fetal Kidney	Human Fetal Kidney	Kidney			Uni-ZAP XR
H0050	Human Fetal Heart	Human Fetal Heart	Heart			Uni-ZAP XR
H0051	Human Hippocampus	Human Hippocampus	Brain			Uni-ZAP XR
H0052	Human Cerebellum	Human Cerebellum	Brain			Uni-ZAP XR
H0053	Human Adult Kidney	Human Adult Kidney	Kidney			Uni-ZAP XR
H0056	Human Umbilical Vein, Endo. remake	Human Umbilical Vein Endothelial Cells	Umbilical vein			Uni-ZAP XR
H0057	Human Fetal Spleen					Uni-ZAP XR
H0058	Human Thymus Tumor	Human Thymus Tumor	Thymus		disease	Lambda ZAP II
H0059	Human Uterine Cancer	Human Uterine Cancer	Uterus		disease	Lambda ZAP II
H0060	Human Macrophage	Human Macrophage	Blood	Cell Line		pBluescript
H0061	Human Macrophage	Human Macrophage	Blood	Cell Line		pBluescript
H0063	Human Thymus	Human Thymus	Thymus			Uni-ZAP XR
H0065	Human Esophagus, Normal	Human Esophagus, normal	Esophagus			Uni-ZAP XR
H0067	Human left hemisphere, adult	Human Left Hemisphere, Adult	Brain			Lambda ZAP II
H0068	Human Skin Tumor	Human Skin Tumor	Skin		disease	Uni-ZAP XR
H0069	Human Activated T-Cells	Activated T-Cells	Blood	Cell Line		Uni-ZAP XR
H0070	Human Pancreas	Human Pancreas	Pancreas			Uni-ZAP XR
H0071	Human Infant Adrenal Gland	Human Infant Adrenal Gland	Adrenal gland			Uni-ZAP XR
H0073	Human Leiomyeloid Carcinoma	Human Leiomyeloid Carcinoma	Muscle		disease	Uni-ZAP XR
H0074	Human Platelets	Human Platelets	Blood	Cell Line		Uni-ZAP XR
H0075	Human Activated T-Cells (II)	Activated T-Cells	Blood	Cell Line		Uni-ZAP XR
H0077	Human Thymus Tumor	Human Thymus Tumor	Thymus		disease	Lambda ZAP II
H0078	Human Lung Cancer	Human Lung Cancer	Lung		disease	Lambda ZAP II
H0079	Human Whole 7 Week Old Embryo (II)	Human Whole 7 Week Old Embryo	Embryo			Uni-ZAP XR
H0080	Human Whole 6 Week Old Embryo (II)	Human Whole Six Week Old Embryo	Embryo			Lambda ZAP II
H0081	Human Fetal Epithelium (Skin)	Human Fetal Skin	Skin			Uni-ZAP XR
H0082	Human Fetal Muscle	Human Fetal Muscle	Sk Muscle			Uni-ZAP XR
H0083	HUMAN JURKAT MEMBRANE BOUND POLYSOMES	Jurkat Cells				Uni-ZAP XR
H0084	Human Namalwa Membrane Bound Polysomes	Namalwa Cells				Uni-ZAP XR
H0085	Human Colon	Human Colon				Lambda ZAP II
H0086	Human epithelioid	Epithelioid	Sk Muscle		disease	Uni-ZAP XR

	sarcoma	Sarcoma, muscle				
H0087	Human Thymus	Human Thymus				pBluescript
H0090	Human T-Cell Lymphoma	T-Cell Lymphoma	T-Cell		disease	Uni-ZAP XR
H0092	Human Pancreas Tumor	Human Pancreas Tumor	Pancreas		disease	Uni-ZAP XR
H0093	Human Greater Omentum Tumor	Human Greater Omentum	peritoneum		disease	Uni-ZAP XR
H0095	Human Greater Omentum, RNA Remake	Human Greater Omentum	peritoneum			Uni-ZAP XR
H0096	Human Parotid Cancer	Human Parotid Cancer	Parotid		disease	Lambda ZAP II
H0097	Human Adult Heart, subtracted	Human Adult Heart	Heart			pBluescript
H0098	Human Adult Liver, subtracted	Human Adult Liver	Liver			Uni-ZAP XR
H0099	Human Lung Cancer, subtracted	Human Lung Cancer	Lung			pBluescript
H0100	Human Whole Six Week Old Embryo	Human Whole Six Week Old Embryo	Embryo			Uni-ZAP XR
H0101	Human 7 Weeks Old Embryo, subtracted	Human Whole 7 Week Old Embryo	Embryo			Lambda ZAP II
H0102	Human Whole 6 Week Old Embryo (II), subt	Human Whole Six Week Old Embryo	Embryo			pBluescript
H0103	Human Fetal Brain, subtracted	Human Fetal Brain	Brain			Uni-ZAP XR
H0105	Human Fetal Heart, subtracted	Human Fetal Heart	Heart			pBluescript
H0107	Human Infant Adrenal Gland, subtracted	Human Infant Adrenal Gland	Adrenal gland			pBluescript
H0108	Human Adult Lymph Node, subtracted	Human Adult Lymph Node	Lymph Node			Uni-ZAP XR
H0109	Human Macrophage, subtracted	Macrophage	Blood	Cell Line		pBluescript
H0110	Human Old Ovary, subtracted	Human Old Ovary	Ovary			pBluescript
H0111	Human Placenta, subtracted	Human Placenta	Placenta			pBluescript
H0112	Human Parathyroid Tumor, subtracted	Human Parathyroid Tumor	Parathyroid			pBluescript
H0116	Human Thymus Tumor, subtracted	Human Thymus Tumor	Thymus			pBluescript
H0118	Human Adult Kidney	Human Adult Kidney	Kidney			Uni-ZAP XR
H0119	Human Pediatric Kidney	Human Pediatric Kidney	Kidney			Uni-ZAP XR
H0120	Human Adult Spleen, subtracted	Human Adult Spleen	Spleen			Uni-ZAP XR
H0121	Human Cornea, subtracted	Human Cornea	eye			Uni-ZAP XR
H0122	Human Adult Skeletal Muscle	Human Skeletal Muscle	Sk Muscle			Uni-ZAP XR
H0123	Human Fetal Dura Mater	Human Fetal Dura Mater	Brain			Uni-ZAP XR
H0124	Human Rhabdomyosarcoma	Human Rhabdomyosarcoma	Sk Muscle		disease	Uni-ZAP XR
H0125	Cem cells cyclohexamide treated	Cyclohexamide Treated Cem, Jurkat, Raji, and Supt	Blood	Cell Line		Uni-ZAP XR
H0128	Jurkat cells, thiouridine activated	Jurkat Cells				Uni-ZAP XR
H0130	LNCAP untreated	LNCAP Cell Line	Prostate	Cell Line		Uni-ZAP XR
H0131	LNCAP + 0.3nM R1881	LNCAP Cell Line	Prostate	Cell Line		Uni-ZAP XR
H0132	LNCAP + 30nM R1881	LNCAP Cell Line	Prostate	Cell Line		Uni-ZAP XR
H0134	Raji Cells, cyclohexamide	Cyclohexamide	Blood	Cell Line		Uni-ZAP XR

	treated	Treated Cem, Jurkat, Raji, and Supt				
H0135	Human Synovial Sarcoma	Human Synovial Sarcoma	Synovium			Uni-ZAP XR
H0136	Supt Cells, cyclohexamide treated	Cyclohexamide Treated Cem, Jurkat, Raji, and Supt	Blood	Cell Line		Uni-ZAP XR
H0140	Activated T-Cells, 8 hrs.	Activated T-Cells	Blood	Cell Line		Uni-ZAP XR
H0141	Activated T-Cells, 12 hrs.	Activated T-Cells	Blood	Cell Line		Uni-ZAP XR
H0142	MCF7 Cell Line	MCF7 Cell line	Breast	Cell Line		Uni-ZAP XR
H0144	Nine Week Old Early Stage Human	9 Wk Old Early Stage Human	Embryo			Uni-ZAP XR
H0147	Human Adult Liver	Human Adult Liver	Liver			Uni-ZAP XR
H0149	7 Week Old Early Stage Human, subtracted	Human Whole 7 Week Old Embryo	Embryo			Uni-ZAP XR
H0150	Human Epididymus	Epididymis	Testis			Uni-ZAP XR
H0151	Early Stage Human Liver	Human Fetal Liver	Liver			Uni-ZAP XR
H0154	Human Fibrosarcoma	Human Skin Fibrosarcoma	Skin		disease	Uni-ZAP XR
H0156	Human Adrenal Gland Tumor	Human Adrenal Gland Tumor	Adrenal Gland		disease	Uni-ZAP XR
H0157	Activated T-Cells, 0 hrs, ligation 2	Activated T-Cells	Blood	Cell Line		Uni-ZAP XR
H0158	Activated T-Cells, 4 hrs., ligation 2	Activated T-Cells	Blood	Cell Line		Uni-ZAP XR
H0159	Activated T-Cells, 8 hrs., ligation 2	Activated T-Cells	Blood	Cell Line		Uni-ZAP XR
H0161	Activated T-Cells, 24 hrs., ligation 2	Activated T-Cells	Blood	Cell Line		Uni-ZAP XR
H0163	Human Synovium	Human Synovium	Synovium			Uni-ZAP XR
H0164	Human Trachea Tumor	Human Trachea Tumor	Trachea		disease	Uni-ZAP XR
H0165	Human Prostate Cancer, Stage B2	Human Prostate Cancer, stage B2	Prostate		disease	Uni-ZAP XR
H0166	Human Prostate Cancer, Stage B2 fraction	Human Prostate Cancer, stage B2	Prostate		disease	Uni-ZAP XR
H0167	Activated T-Cells, 24 hrs.	Activated T-Cells	Blood	Cell Line		Uni-ZAP XR
H0169	Human Prostate Cancer, Stage C fraction	Human Prostate Cancer, stage C	Prostate		disease	Uni-ZAP XR
H0170	12 Week Old Early Stage Human	Twelve Week Old Early Stage Human	Embryo			Uni-ZAP XR
H0171	12 Week Old Early Stage Human, II	Twelve Week Old Early Stage Human	Embryo			Uni-ZAP XR
H0172	Human Fetal Brain, random primed	Human Fetal Brain	Brain			Lambda ZAP II
H0173	Human Cardiomyopathy, RNA remake	Human Cardiomyopathy	Heart		disease	Uni-ZAP XR
H0176	CAMA1Ee Cell Line	CAMA1Ee Cell Line	Breast	Cell Line		Uni-ZAP XR
H0177	CAMA1Ee Cell Line	CAMA1Ee Cell Line	Breast	Cell Line		Uni-ZAP XR
H0178	Human Fetal Brain	Human Fetal Brain	Brain			Uni-ZAP XR
H0179	Human Neutrophil	Human Neutrophil	Blood	Cell Line		Uni-ZAP XR
H0180	Human Primary Breast Cancer	Human Primary Breast Cancer	Breast		disease	Uni-ZAP XR
H0181	Human Primary Breast Cancer	Human Primary Breast Cancer	Breast		disease	Uni-ZAP XR
H0182	Human Primary Breast Cancer	Human Primary Breast Cancer	Breast		disease	Uni-ZAP XR
H0183	Human Colon Cancer	Human Colon Cancer	Colon		disease	Uni-ZAP XR
H0184	Human Colon Cancer, metasticized to live	Human Colon Cancer, metasticized	Liver		disease	Lambda ZAP II

		to liver				
H0185	Activated T-Cell labeled with 4-thioluri	T-Cells	Blood	Cell Line		Lambda ZAP II
H0187	Resting T-Cell	T-Cells	Blood	Cell Line		Lambda ZAP II
H0188	Human Normal Breast	Human Normal Breast	Breast			Uni-ZAP XR
H0189	Human Resting Macrophage	Human Macrophage/Monocytes	Blood	Cell Line		Uni-ZAP XR
H0190	Human Activated Macrophage (LPS)	Human Macrophage/Monocytes	Blood	Cell Line		Uni-ZAP XR
H0191	Human Activated Macrophage (LPS), thiour	Human Macrophage/Monocytes	Blood	Cell Line		Uni-ZAP XR
H0192	Cem Cells, cyclohexamide treated, subtra	Cyclohexamide Treated Cem, Jurkat, Raji, and Supt	Blood	Cell Line		Uni-ZAP XR
H0194	Human Cerebellum, subtracted	Human Cerebellum	Brain			pBluescript
H0196	Human Cardiomyopathy, subtracted	Human Cardiomyopathy	Heart			Uni-ZAP XR
H0197	Human Fetal Liver, subtracted	Human Fetal Liver	Liver			Uni-ZAP XR
H0198	Human Fetal Liver, subtracted, pos. clon	Human Fetal Liver	Liver			Uni-ZAP XR
H0199	Human Fetal Liver, subtracted, neg clone	Human Fetal Liver	Liver			Uni-ZAP XR
H0200	Human Greater Omentum, fract II remake,	Human Greater Omentum	peritoneum			Uni-ZAP XR
H0201	Human Hippocampus, subtracted	Human Hippocampus	Brain			pBluescript
H0202	Jurkat Cells, cyclohexamide treated, subtraction	Cyclohexamide Treated Cem, Jurkat, Raji, and Supt	Blood	Cell Line		Uni-ZAP XR
H0203	Jurkat Cells, cyclohexamide treated, dif	Cyclohexamide Treated Cem, Jurkat, Raji, and Supt	Blood	Cell Line		Uni-ZAP XR
H0204	Human Colon Cancer, subtracted	Human Colon Cancer	Colon			pBluescript
H0205	Human Colon Cancer, differential	Human Colon Cancer	Colon			pBluescript
H0207	LNCAP, differential expression	LNCAP Cell Line	Prostate	Cell Line		pBluescript
H0208	Early Stage Human Lung, subtracted	Human Fetal Lung	Lung			pBluescript
H0211	Human Prostate,differential expression	Human Prostate	Prostate			pBluescript
H0212	Human Prostate, subtracted	Human Prostate	Prostate			pBluescript
H0213	Human Pituitary, subtracted	Human Pituitary				Uni-ZAP XR
H0214	Raji cells, cyclohexamide treated, subtracted	Cyclohexamide Treated Cem, Jurkat, Raji, and Supt	Blood	Cell Line		pBluescript
H0215	Raji cells, cyclohexamide treated, differentially expressed	Cyclohexamide Treated Cem, Jurkat, Raji, and Supt	Blood	Cell Line		pBluescript
H0216	Supt cells, cyclohexamide treated, subtracted	Cyclohexamide Treated Cem, Jurkat, Raji, and Supt	Blood	Cell Line		pBluescript

H0217	Supt cells, cyclohexamide treated, differentially expressed	Cyclohexamide Treated Cem, Jurkat, Raji, and Supt	Blood	Cell Line		pBluescript
H0218	Activated T-Cells, 0hrs, subtracted	Activated T-Cells	Blood	Cell Line		Uni-ZAP XR
H0219	Activated T-Cells, 0hrs, differentially expressed	Activated T-Cells	Blood	Cell Line		Uni-ZAP XR
H0220	Activated T-Cells, 4 hrs, subtracted	Activated T-Cells	Blood	Cell Line		Uni-ZAP XR
H0221	Activated T-Cells, 4 hrs, differentially expressed	Activated T-Cells	Blood	Cell Line		Uni-ZAP XR
H0222	Activated T-Cells, 8 hrs, subtracted	Activated T-Cells	Blood	Cell Line		Uni-ZAP XR
H0223	Activated T-Cells, 8 hrs, differentially expressed	Activated T-Cells	Blood	Cell Line		Uni-ZAP XR
H0224	Activated T-Cells, 12 hrs, subtracted	Activated T-Cells	Blood	Cell Line		Uni-ZAP XR
H0225	Activated T-Cells, 12hrs, differentially expressed	Activated T-Cells	Blood	Cell Line		Uni-ZAP XR
H0228	C7MCF7 cell line, estrogen treated	C7MCF7 Cell Line, estrogen treated	Breast	Cell Line		Uni-ZAP XR
H0229	Early Stage Human Brain, random primed	Early Stage Human Brain	Brain			Lambda ZAP II
H0230	Human Cardiomyopathy, diff exp	Human Cardiomyopathy	Heart		disease	Uni-ZAP XR
H0231	Human Colon, subtraction	Human Colon				pBluescript
H0232	Human Colon, differential expression	Human Colon				pBluescript
H0234	human colon cancer, metastatic to liver, differentially expressed	Human Colon Cancer, metasticized to liver	Liver			pBluescript
H0235	Human colon cancer, metaticized to liver, subtraction	Human Colon Cancer, metasticized to liver	Liver			pBluescript
H0238	Human Myometrium Leiomyoma	Human Myometrium Leiomyoma	Uterus		disease	Uni-ZAP XR
H0239	Human Kidney Tumor	Human Kidney Tumor	Kidney		disease	Uni-ZAP XR
H0241	C7MCF7 cell line, estrogen treated, subtraction	C7MCF7 Cell Line, estrogen treated	Breast	Cell Line		Uni-ZAP XR
H0242	Human Fetal Heart, Differential (Fetal-Specific)	Human Fetal Heart	Heart			pBluescript
H0244	Human 8 Week Whole Embryo, subtracted	Human 8 Week Old Embryo	Embryo			Uni-ZAP XR
H0245	Human 8 Week Whole Embryo, differential	Human 8 Week Old Embryo	Embryo			Uni-ZAP XR
H0246	Human Fetal Liver-Enzyme subtraction	Human Fetal Liver	Liver			Uni-ZAP XR
H0247	Human Membrane Bound Polysomes- Enzyme Subtraction	Human Membrane Bound Polysomes	Blood	Cell Line		Uni-ZAP XR
H0249	HE7, subtracted by hybridization with E7 cDNA	Human Whole 7 Week Old Embryo	Embryo			Uni-ZAP XR
H0250	Human Activated Monocytes	Human Monocytes				Uni-ZAP XR
H0251	Human Chondrosarcoma	Human Chondrosarcoma	Cartilage		disease	Uni-ZAP XR
H0252	Human Osteosarcoma	Human Osteosarcoma	Bone		disease	Uni-ZAP XR

H0253	Human adult testis, large inserts	Human Adult Testis	Testis			Uni-ZAP XR
H0254	Breast Lymph node cDNA library	Breast Lymph Node	Lymph Node			Uni-ZAP XR
H0255	breast lymph node CDNA library	Breast Lymph Node	Lymph Node			Lambda ZAP II
H0256	HL-60, unstimulated	Human HL-60 Cells, unstimulated	Blood	Cell Line		Uni-ZAP XR
H0257	HL-60, PMA 4H	HL-60 Cells, PMA stimulated 4H	Blood	Cell Line		Uni-ZAP XR
H0261	H. cerebellum, Enzyme subtracted	Human Cerebellum	Brain			Uni-ZAP XR
H0263	human colon cancer	Human Colon Cancer	Colon		disease	Lambda ZAP II
H0264	human tonsils	Human Tonsil	Tonsil			Uni-ZAP XR
H0265	Activated T-Cell (12hs)/Thiouridine labelledEco	T-Cells	Blood	Cell Line		Uni-ZAP XR
H0266	Human Microvascular Endothelial Cells, fract. A	HMEC	Vein	Cell Line		Lambda ZAP II
H0267	Human Microvascular Endothelial Cells, fract. B	HMEC	Vein	Cell Line		Lambda ZAP II
H0268	Human Umbilical Vein Endothelial Cells, fract. A	HUVE Cells	Umbilical vein	Cell Line		Lambda ZAP II
H0269	Human Umbilical Vein Endothelial Cells, fract. B	HUVE Cells	Umbilical vein	Cell Line		Lambda ZAP II
H0270	HPAS (human pancreas, subtracted)	Human Pancreas	Pancreas			Uni-ZAP XR
H0271	Human Neutrophil, Activated	Human Neutrophil - Activated	Blood	Cell Line		Uni-ZAP XR
H0272	HUMAN TONSILS, FRACTION 2	Human Tonsil	Tonsil			Uni-ZAP XR
H0274	Human Adult Spleen, fractionII	Human Adult Spleen	Spleen			Uni-ZAP XR
H0275	Human Infant Adrenal Gland, Subtracted	Human Infant Adrenal Gland	Adrenal gland			pBluescript
H0280	K562 + PMA (36 hrs)	K562 Cell line	cell line	Cell Line		ZAP Express
H0282	HBGB"s differential consolidation	Human Primary Breast Cancer	Breast			Uni-ZAP XR
H0284	Human OB MG63 control fraction I	Human Osteoblastoma MG63 cell line	Bone	Cell Line		Uni-ZAP XR
H0286	Human OB MG63 treated (10 nM E2) fraction I	Human Osteoblastoma MG63 cell line	Bone	Cell Line		Uni-ZAP XR
H0288	Human OB HOS control fraction I	Human Osteoblastoma HOS cell line	Bone	Cell Line		Uni-ZAP XR
H0290	Human OB HOS treated (1 nM E2) fraction I	Human Osteoblastoma HOS cell line	Bone	Cell Line		Uni-ZAP XR
H0292	Human OB HOS treated (10 nM E2) fraction I	Human Osteoblastoma HOS cell line	Bone	Cell Line		Uni-ZAP XR
H0293	WI 38 cells					Uni-ZAP XR
H0294	Amniotic Cells - TNF induced	Amniotic Cells - TNF induced	Placenta	Cell Line		Uni-ZAP XR
H0295	Amniotic Cells - Primary Culture	Amniotic Cells - Primary Culture	Placenta	Cell Line		Uni-ZAP XR
H0298	HCBB"s differential consolidation	CAMA1Ee Cell Line	Breast	Cell Line		Uni-ZAP XR
H0299	HCBA"s differential consolidation	CAMA1Ee Cell Line	Breast	Cell Line		Uni-ZAP XR

H0300	CD34 positive cells (Cord Blood)	CD34 Positive Cells	Cord Blood			ZAP Express
H0305	CD34 positive cells (Cord Blood)	CD34 Positive Cells	Cord Blood			ZAP Express
H0306	CD34 depleted Buffy Coat (Cord Blood)	CD34 Depleted Buffy Coat (Cord Blood)	Cord Blood			ZAP Express
H0309	Human Chronic Synovitis	Synovium, Chronic Synovitis/ Osteoarthritis	Synovium		disease	Uni-ZAP XR
H0310	human caudate nucleus	Brain	Brain			Uni-ZAP XR
H0313	human pleural cancer	pleural cancer			disease	pBluescript
H0316	HUMAN STOMACH	Human Stomach	Stomach			Uni-ZAP XR
H0318	HUMAN B CELL LYMPHOMA	Human B Cell Lymphoma	Lymph Node		disease	Uni-ZAP XR
H0320	Human frontal cortex	Human Frontal Cortex	Brain			Uni-ZAP XR
H0321	HUMAN SCHWANOMA	Schwanoma	Nerve		disease	Uni-ZAP XR
H0327	human corpus colosum	Human Corpus Callosum	Brain			Uni-ZAP XR
H0328	human ovarian cancer	Ovarian Cancer	Ovary		disease	Uni-ZAP XR
H0329	Dermatofibrosarcoma Protuberance	Dermatofibrosarcoma Protuberans	Skin		disease	Uni-ZAP XR
H0330	HCBB"s Subtractive (-mito genes)	CAMA1Ee Cell Line	Breast	Cell Line		Uni-ZAP XR
H0331	Hepatocellular Tumor	Hepatocellular Tumor	Liver		disease	Lambda ZAP II
H0333	Hemangiopericytoma	Hemangiopericytoma	Blood vessel		disease	Lambda ZAP II
H0334	Kidney cancer	Kidney Cancer	Kidney		disease	Uni-ZAP XR
H0339	Duodenum	Duodenum				Uni-ZAP XR
H0340	Corpus Callosum	Corpus Collosum-93052				Uni-ZAP XR
H0341	Bone Marrow Cell Line (RS4;11)	Bone Marrow Cell Line RS4;11	Bone Marrow	Cell Line		Uni-ZAP XR
H0343	stomach cancer (human)	Stomach Cancer - 5383A (human)			disease	Uni-ZAP XR
H0345	SKIN	Skin - 4000868H	Skin			Uni-ZAP XR
H0346	Brain-medulloblastoma	Brain (Medulloblastoma)-9405C006R	Brain		disease	Uni-ZAP XR
H0349	human adult liver cDNA library	Human Adult Liver	Liver			pCMVSport 1
H0350	Human Fetal Liver, mixed 10 & 14 week	Human Fetal Liver, mixed 10&14 Week	Liver			Uni-ZAP XR
H0351	Glioblastoma	Glioblastoma	Brain		disease	Uni-ZAP XR
H0352	wilm"s tumor	Wilm"s Tumor			disease	Uni-ZAP XR
H0354	Human Leukocytes	Human Leukocytes	Blood	Cell Line		pCMVSport 1
H0355	Human Liver	Human Liver, normal Adult				pCMVSport 1
H0356	Human Kidney	Human Kidney	Kidney			pCMVSport 1
H0357	H. Normalized Fetal Liver, II	Human Fetal Liver	Liver			Uni-ZAP XR
H0359	KMH2 cell line	KMH2				ZAP Express
H0361	Human rejected kidney	Human Rejected Kidney			disease	pBluescript
H0362	HeLa cell line	HELA CELL LINE				pSport1
H0364	Human Osteoclastoma, excised	Human Osteoclastoma			disease	pBluescript
H0365	Osteoclastoma-normalized B	Human Osteoclastoma			disease	Uni-ZAP XR

H0366	L428 cell line	L428				ZAP Express
H0369	H. Atrophic Endometrium	Atrophic Endometrium and myometrium				Uni-ZAP XR
H0370	H. Lymph node breast Cancer	Lymph node with Met. Breast Cancer			disease	Uni-ZAP XR
H0372	Human Testes	Human Testes	Testis			pCMVSport 1
H0373	Human Heart	Human Adult Heart	Heart			pCMVSport 1
H0374	Human Brain	Human Brain				pCMVSport 1
H0375	Human Lung	Human Lung				pCMVSport 1
H0376	Human Spleen	Human Adult Spleen	Spleen			pCMVSport 1
H0379	Human Tongue, frac 1	Human Tongue				pSport1
H0380	Human Tongue, frac 2	Human Tongue				pSport1
H0381	Bone Cancer	Bone Cancer			disease	Uni-ZAP XR
H0383	Human Prostate BPH, re-excision	Human Prostate BPH				Uni-ZAP XR
H0384	Brain, Kozak	Human Brain				pCMVSport 1
H0386	Leukocyte and Lung; 4 screens	Human Leukocytes	Blood	Cell Line		pCMVSport 1
H0388	Human Rejected Kidney, 704 re-excision	Human Rejected Kidney			disease	pBluescript
H0389	H. Brain, X-Chromosome hybridization	Human Brain				pCMVSport 1
H0390	Human Amygdala Depression, re-excision	Human Amygdala Depression			disease	pBluescript
H0391	H. Meniingima, M6	Human Meningima	brain			pSport1
H0392	H. Meningima, M1	Human Meningima	brain			pSport1
H0393	Fetal Liver, subtraction II	Human Fetal Liver	Liver			pBluescript
H0394	A-14 cell line	Redd-Sternberg cell				ZAP Express
H0395	A1-CELL LINE	Redd-Sternberg cell				ZAP Express
H0396	L1 Cell line	Redd-Sternberg cell				ZAP Express
H0399	Human Kidney Cortex, re-rescue	Human Kidney Cortex				Lambda ZAP II
H0400	Human Striatum Depression, re-rescue	Human Brain, Striatum Depression	Brain			Lambda ZAP II
H0401	Human Pituitary, subtracted V	Human Pituitary				pBluescript
H0402	CD34 depleted Buffy Coat (Cord Blood), re-excision	CD34 Depleted Buffy Coat (Cord Blood)	Cord Blood			ZAP Express
H0403	H. Umbilical Vein Endothelial Cells, IL4 induced	HUVE Cells	Umbilical vein	Cell Line		Uni-ZAP XR
H0404	H. Umbilical Vein endothelial cells, uninduced	HUVE Cells	Umbilical vein	Cell Line		Uni-ZAP XR
H0405	Human Pituitary, subtracted VI	Human Pituitary				pBluescript
H0406	H Amygdala Depression, subtracted	Human Amygdala Depression				Uni-ZAP XR
H0408	Human kidney Cortex, subtracted	Human Kidney Cortex				pBluescript
H0409	H. Striatum Depression, subtracted	Human Brain, Striatum Depression	Brain			pBluescript
H0411	H Female Bladder, Adult	Human Female Adult Bladder	Bladder			pSport1
H0412	Human umbilical vein	HUVE Cells	Umbilical	Cell Line		pSport1

	endothelial cells, IL-4 induced		vein			
H0413	Human Umbilical Vein Endothelial Cells, uninduced	HUVE Cells	Umbilical vein	Cell Line		pSport1
H0414	Ovarian Tumor I, OV5232	Ovarian Tumor, OV5232	Ovary		disease	pSport1
H0415	H. Ovarian Tumor, II, OV5232	Ovarian Tumor, OV5232	Ovary		disease	pCMVSport 2.0
H0416	Human Neutrophils, Activated, re-excision	Human Neutrophil - Activated	Blood	Cell Line		pBluescript
H0417	Human Pituitary, subtracted VIII	Human Pituitary				pBluescript
H0418	Human Pituitary, subtracted VII	Human Pituitary				pBluescript
H0419	Bone Cancer, re-excision	Bone Cancer				Uni-ZAP XR
H0421	Human Bone Marrow, re-excision	Bone Marrow				pBluescript
H0422	T-Cell PHA 16 hrs	T-Cells	Blood	Cell Line		pSport1
H0423	T-Cell PHA 24 hrs	T-Cells	Blood	Cell Line		pSport1
H0424	Human Pituitary, subt IX	Human Pituitary				pBluescript
H0427	Human Adipose	Human Adipose, left hiplipoma				pSport1
H0428	Human Ovary	Human Ovary Tumor	Ovary			pSport1
H0429	K562 + PMA (36 hrs),re-excision	K562 Cell line	cell line	Cell Line		ZAP Express
H0431	H. Kidney Medulla, re-excision	Kidney medulla	Kidney			pBluescript
H0432	H. Kidney Pyramid	Kidney pyramids	Kidney			pBluescript
H0433	Human Umbilical Vein Endothelial cells, frac B, re-excision	HUVE Cells	Umbilical vein	Cell Line		pBluescript
H0434	Human Brain, striatum, re-excision	Human Brain, Striatum				pBluescript
H0435	Ovarian Tumor 10-3-95	Ovarian Tumor, OV350721	Ovary			pCMVSport 2.0
H0436	Resting T-Cell Library,II	T-Cells	Blood	Cell Line		pSport1
H0437	H Umbilical Vein Endothelial Cells, frac A, re-excision	HUVE Cells	Umbilical vein	Cell Line		Lambda ZAP II
H0438	H. Whole Brain #2, re-excision	Human Whole Brain #2				ZAP Express
H0439	Human Eosinophils	Eosinophils				pBluescript
H0441	H. Kidney Cortex, subtracted	Kidney cortex	Kidney			pBluescript
H0442	H. Striatum Depression, subt II	Human Brain, Striatum Depression	Brain			pBluescript
H0443	H. Adipose, subtracted	Human Adipose, left hiplipoma				pSport1
H0444	Spleen metastic melanoma	Spleen, Metastic malignant melanoma	Spleen		disease	pSport1
H0445	Spleen, Chronic lymphocytic leukemia	Human Spleen, CLL	Spleen		disease	pSport1
H0449	CD34+ cell, I	CD34 positive cells				pSport1
H0450	CD34+cells, II	CD34 positive cells				pCMVSport 2.0
H0453	H. Kidney Pyramid, subtracted	Kidney pyramids	Kidney			pBluescript
H0455	H. Striatum Depression, subt	Human Brain, Striatum Depression	Brain			pBluescript
H0456	H Kidney Cortex,	Human Kidney				pBluescript

	subtracted III	Cortex				
H0457	Human Eosinophils	Human Eosinophils				pSport1
H0458	CD34+ cell, I, frac II	CD34 positive cells				pSport1
H0459	CD34+cells, II, FRACTION 2	CD34 positive cells				pCMVSport 2.0
H0461	H. Kidney Medulla, subtracted	Kidney medulla	Kidney			pBluescript
H0462	H. Amygdala Depression, subtracted		Brain			pBluescript
H0477	Human Tonsil, Lib 3	Human Tonsil	Tonsil			pSport1
H0478	Salivary Gland, Lib 2	Human Salivary Gland	Salivary gland			pSport1
H0479	Salivary Gland, Lib 3	Human Salivary Gland	Salivary gland			pSport1
H0483	Breast Cancer cell line, MDA 36	Breast Cancer Cell line, MDA 36				pSport1
H0484	Breast Cancer Cell line, angiogenic	Breast Cancer Cell line, Angiogenic, 36T3				pSport1
H0485	Hodgkin"s Lymphoma I	Hodgkin"s Lymphoma I			disease	pCMVSport 2.0
H0486	Hodgkin"s Lymphoma II	Hodgkin"s Lymphoma II			disease	pCMVSport 2.0
H0487	Human Tonsils, lib I	Human Tonsils				pCMVSport 2.0
H0488	Human Tonsils, Lib 2	Human Tonsils				pCMVSport 2.0
H0489	Crohn"s Disease	Ileum	Intestine		disease	pSport1
H0490	Hl-60, untreated, subtracted	Human HL-60 Cells, unstimulated	Blood	Cell Line		Uni-ZAP XR
H0491	HL-60, PMA 4H, subtracted	HL-60 Cells, PMA stimulated 4H	Blood	Cell Line		Uni-ZAP XR
H0492	HL-60, RA 4h, Subtracted	HL-60 Cells, RA stimulated for 4H	Blood	Cell Line		Uni-ZAP XR
H0493	HL-60, PMA 1d, subtracted	HL-60 Cells, PMA stimulated for 1 day	Blood	Cell Line		Uni-ZAP XR
H0494	Keratinocyte	Keratinocyte				pCMVSport 2.0
H0497	HEL cell line	HEL cell line		HEL 92.1.7		pSport1
H0505	Human Astrocyte	Human Astrocyte				pSport1
H0506	Ulcerative Colitis	Colon	Colon			pSport1
H0509	Liver, Hepatoma	Human Liver, Hepatoma, patient 8	Liver		disease	pCMVSport 3.0
H0510	Human Liver, normal	Human Liver, normal, Patient # 8	Liver			pCMVSport 3.0
H0512	Keratinocyte, lib 3	Keratinocyte				pCMVSport 2.0
H0517	Nasal polyps	Nasal polyps				pCMVSport 2.0
H0518	pBMC stimulated w/ poly I/C	pBMC stimulated with poly I/C				pCMVSport 3.0
H0519	NTERA2, control	NTERA2, Teratocarcinoma cell line				pCMVSport 3.0
H0520	NTERA2 + retinoic acid, 14 days	NTERA2, Teratocarcinoma cell line				pSport1
H0521	Primary Dendritic Cells, lib 1	Primary Dendritic cells				pCMVSport 3.0
H0522	Primary Dendritic cells,frac 2	Primary Dendritic cells				pCMVSport 3.0
H0523	Primary Dendritic	Primary Dendritic				pSport1

	cells,CapFinder2, frac 1	cells				
H0525	PCR, pBMC I/C treated	pBMC stimulated with poly I/C				PCRII
H0528	Poly[I]/Poly[C] Normal Lung Fibroblasts	Poly[I]/Poly[C] Normal Lung Fibroblasts				pCMVSport 3.0
H0529	Myoloid Progenitor Cell Line	TF-1 Cell Line; Myoloid progenitor cell line				pCMVSport 3.0
H0530	Human Dermal Endothelial Cells,untreated	Human Dermal Endothelial Cells; untreated				pSport1
H0535	Human ovary tumor cell OV350721	Ovarian Tumor, OV350721	Ovary		disease	pSport1
H0537	H. Primary Dendritic Cells,lib 3	Primary Dendritic cells				pCMVSport 2.0
H0538	Merkel Cells	Merkel cells	Lymph node			pSport1
H0539	Pancreas Islet Cell Tumor	Pancreas Islet Cell Tumour	Pancreas		disease	pSport1
H0540	Skin, burned	Skin, leg burned	Skin			pSport1
H0542	T Cell helper I	Helper T cell				pCMVSport 3.0
H0543	T cell helper II	Helper T cell				pCMVSport 3.0
H0544	Human endometrial stromal cells	Human endometrial stromal cells				pCMVSport 3.0
H0545	Human endometrial stromal cells-treated with progesterone	Human endometrial stromal cells-treated with proge				pCMVSport 3.0
H0546	Human endometrial stromal cells-treated with estradiol	Human endometrial stromal cells-treated with estra				pCMVSport 3.0
H0547	NTERA2 teratocarcinoma cell line+retinoic acid (14 days)	NTERA2, Teratocarcinoma cell line				pSport1
H0548	Human Skin Fibroblasts, normal	Human Skin Fibroblasts				pBluescript
H0549	H. Epididiymus, caput & corpus	Human Epididiymus, caput and corpus				Uni-ZAP XR
H0550	H. Epididiymus, cauda	Human Epididiymus, cauda				Uni-ZAP XR
H0551	Human Thymus Stromal Cells	Human Thymus Stromal Cells				pCMVSport 3.0
H0552	Signal trap,Femur Bone Marrow,pooled	Femur Bone marrow, pooled from 8 male/female				Other
H0553	Human Placenta	Human Placenta				pCMVSport 3.0
H0555	Rejected Kidney, lib 4	Human Rejected Kidney	Kidney		disease	pCMVSport 3.0
H0556	Activated T-cell(12h)/Thiouridine-re-excision	T-Cells	Blood	Cell Line		Uni-ZAP XR
H0559	HL-60, PMA 4H, re-excision	HL-60 Cells, PMA stimulated 4H	Blood	Cell Line		Uni-ZAP XR
H0560	KMH2	KMH2				pCMVSport 3.0
H0561	L428	L428				pCMVSport 3.0
H0562	Human Fetal Brain, normalized c5-11-26	Human Fetal Brain				pCMVSport 2.0
H0563	Human Fetal Brain,	Human Fetal Brain				pCMVSport

	normalized 50021F					2.0
H0564	Human Fetal Brain, normalized C5001F	Human Fetal Brain				pCMVSport 2.0
H0565	HUman Fetal Brain, normalized 100024F	Human Fetal Brain				pCMVSport 2.0
H0566	Human Fetal Brain,normalized c50F	Human Fetal Brain				pCMVSport 2.0
H0567	Human Fetal Brain, normalized A5002F	Human Fetal Brain				pCMVSport 2.0
H0569	Human Fetal Brain, normalized CO	Human Fetal Brain				pCMVSport 2.0
H0570	Human Fetal Brain, normalized C500H	Human Fetal Brain				pCMVSport 2.0
H0571	Human Fetal Brain, normalized C500HE	Human Fetal Brain				pCMVSport 2.0
H0572	Human Fetal Brain, normalized AC5002	Human Fetal Brain				pCMVSport 2.0
H0574	Hepatocellular Tumor; re-excision	Hepatocellular Tumor	Liver		disease	Lambda ZAP II
H0575	Human Adult Pulmonary;re-excision	Human Adult Pulmonary	Lung			Uni-ZAP XR
H0576	Resting T-Cell; re-excision	T-Cells	Blood	Cell Line		Lambda ZAP II
H0578	Human Fetal Thymus	Fetal Thymus	Thymus			pSport1
H0579	Pericardium	Pericardium	Heart			pSport1
H0580	Dendritic cells, pooled	Pooled dendritic cells				pCMVSport 3.0
H0581	Human Bone Marrow, treated	Human Bone Marrow	Bone Marrow			pCMVSport 3.0
H0583	B Cell lymphoma	B Cell Lymphoma	B Cell		disease	pCMVSport 3.0
H0584	Activated T-cells, 24 hrs,re-excision	Activated T-Cells	Blood	Cell Line		Uni-ZAP XR
H0585	Activated T-Cells,12 hrs,re-excision	Activated T-Cells	Blood	Cell Line		Uni-ZAP XR
H0586	Healing groin wound, 6.5 hours post incision	healing groin wound, 6.5 hours post incision - 2/	groin		disease	pCMVSport 3.0
H0587	Healing groin wound; 7.5 hours post incision	Groin-2/19/97	groin		disease	pCMVSport 3.0
H0589	CD34 positive cells (cord blood),re-ex	CD34 Positive Cells	Cord Blood			ZAP Express
H0590	Human adult small intestine,re-excision	Human Adult Small Intestine	Small Int.			Uni-ZAP XR
H0591	Human T-cell lymphoma;re-excision	T-Cell Lymphoma	T-Cell		disease	Uni-ZAP XR
H0592	Healing groin wound - zero hr post-incision (control)	HGS wound healing project; abdomen			disease	pCMVSport 3.0
H0593	Olfactory epithelium;nasalcavity	Olfactory epithelium from roof of left nasal cacit				pCMVSport 3.0
H0594	Human Lung Cancer;re-excision	Human Lung Cancer	Lung		disease	Lambda ZAP II
H0595	Stomach cancer (human);re-excision	Stomach Cancer - 5383A (human)			disease	Uni-ZAP XR
H0596	Human Colon Cancer;re-excision	Human Colon Cancer	Colon			Lambda ZAP II
H0597	Human Colon; re-excision	Human Colon				Lambda ZAP II
H0598	Human Stomach;re-excision	Human Stomach	Stomach			Uni-ZAP XR
H0599	Human Adult Heart;re-	Human Adult Heart	Heart			Uni-ZAP XR

	excision					
H0600	Healing Abdomen wound;70&90 min post incision	Abdomen			disease	pCMVSport 3.0
H0601	Healing Abdomen Wound;15 days post incision	Abdomen			disease	pCMVSport 3.0
H0602	Healing Abdomen Wound;21&29 days post incision	Abdomen			disease	pCMVSport 3.0
H0604	Human Pituitary, re-excision	Human Pituitary				pBluescript
H0606	Human Primary Breast Cancer;re-excision	Human Primary Breast Cancer	Breast		disease	Uni-ZAP XR
H0607	H.Leukocytes, normalized cot 50A3	H.Leukocytes				pCMVSport 1
H0608	H. Leukocytes, control	H.Leukocytes				pCMVSport 1
H0609	H. Leukocytes, normalized cot > 500A	H.Leukocytes				pCMVSport 1
H0610	H. Leukocytes, normalized cot 5A	H.Leukocytes				pCMVSport 1
H0611	H. Leukocytes, normalized cot 500 B	H.Leukocytes				pCMVSport 1
H0612	H.Leukocytes, normalized cot 50 B	H.Leukocytes				pCMVSport 1
H0613	H.Leukocytes, normalized cot 5B	H.Leukocytes				pCMVSport 1
H0614	H. Leukocytes, normalized cot 500 A	H.Leukocytes				pCMVSport 1
H0615	Human Ovarian Cancer Reexcision	Ovarian Cancer	Ovary		disease	Uni-ZAP XR
H0616	Human Testes, Reexcision	Human Testes	Testis			Uni-ZAP XR
H0617	Human Primary Breast Cancer Reexcision	Human Primary Breast Cancer	Breast		disease	Uni-ZAP XR
H0618	Human Adult Testes, Large Inserts, Reexcision	Human Adult Testis	Testis			Uni-ZAP XR
H0619	Fetal Heart	Human Fetal Heart	Heart			Uni-ZAP XR
H0620	Human Fetal Kidney; Reexcision	Human Fetal Kidney	Kidney			Uni-ZAP XR
H0622	Human Pancreas Tumor; Reexcision	Human Pancreas Tumor	Pancreas		disease	Uni-ZAP XR
H0623	Human Umbilical Vein; Reexcision	Human Umbilical Vein Endothelial Cells	Umbilical vein			Uni-ZAP XR
H0624	12 Week Early Stage Human II; Reexcision	Twelve Week Old Early Stage Human	Embryo			Uni-ZAP XR
H0625	Ku 812F Basophils Line	Ku 812F Basophils				pSport1
H0626	Saos2 Cells; Untreated	Saos2 Cell Line; Untreated				pSport1
H0627	Saos2 Cells; Vitamin D3 Treated	Saos2 Cell Line; Vitamin D3 Treated				pSport1
H0628	Human Pre-Differentiated Adipocytes	Human Pre-Differentiated Adipocytes				Uni-ZAP XR
H0630	Human Leukocytes,normalized control #4	Human Normalized leukocyte				pCMVSport 1
H0631	Saos2, Dexamethosome Treated	Saos2 Cell Line; Dexamethosome Treated				pSport1
H0632	Hepatocellular Tumor;re-excision	Hepatocellular Tumor	Liver			Lambda ZAP II

H0633	Lung Carcinoma A549 TNFalpha activated	TNFalpha activated A549--Lung Carcinoma			disease	pSport1
H0634	Human Testes Tumor, re-excision	Human Testes Tumor	Testis		disease	Uni-ZAP XR
H0635	Human Activated T-Cells, re-excision	Activated T-Cells	Blood	Cell Line		Uni-ZAP XR
H0636	Chondrocytes	Chondrocytes				pSport1
H0637	Dendritic Cells From CD34 Cells	Dentritic cells from CD34 cells				pSport1
H0638	CD40 activated monocyte dendridic cells	CD40 activated monocyte dendridic cells				pSport1
H0639	Ficolled Human Stromal Cells, 5Fu treated	Ficolled Human Stromal Cells, 5Fu treated				Other
H0640	Ficolled Human Stromal Cells, Untreated	Ficolled Human Stromal Cells, Untreated				Other
H0641	LPS activated derived dendritic cells	LPS activated monocyte derived dendritic cells				pSport1
H0642	Hep G2 Cells, lambda library	Hep G2 Cells				Other
H0643	Hep G2 Cells, PCR library	Hep G2 Cells				Other
H0644	Human Placenta (re-excision)	Human Placenta	Placenta			Uni-ZAP XR
H0645	Fetal Heart, re-excision	Human Fetal Heart	Heart			Uni-ZAP XR
H0646	Lung, Cancer (4005313 A3): Invasive Poorly Differentiated Lung Adenocarcinoma,	Metastatic squamous cell lung carcinoma, poorly di				pSport1
H0647	Lung, Cancer (4005163 B7): Invasive, Poorly Diff. Adenocarcinoma, Metastatic	Invasive poorly differentiated lung adenocarcinoma			disease	pSport1
H0648	Ovary, Cancer: (4004562 B6) Papillary Serous Cystic Neoplasm, Low Malignant Pot	Papillary Cstic neoplasm of low malignant potentia			disease	pSport1
H0649	Lung, Normal: (4005313 B1)	Normal Lung				pSport1
H0650	B-Cells	B-Cells				pCMVSport 3.0
H0651	Ovary, Normal: (9805C040R)	Normal Ovary				pSport1
H0652	Lung, Normal: (4005313 B1)	Normal Lung				pSport1
H0653	Stromal Cells	Stromal Cells				pSport1
H0654	Lung, Cancer: (4005313 A3) Invasive Poorly-differentiated Metastatic lung adenoc	Metastatic Squamous cell lung Carcinoma poorly dif				Other
H0656	B-cells (unstimulated)	B-cells (unstimulated)				pSport1
H0657	B-cells (stimulated)	B-cells (stimulated)				pSport1
H0658	Ovary, Cancer (9809C332): Poorly differentiated adenocarcinoma	9809C332- Poorly differentiate	Ovary & Fallopian Tubes		disease	pSport1
H0659	Ovary, Cancer (15395A1F): Grade II Papillary Carcinoma	Grade II Papillary Carcinoma, Ovary	Ovary		disease	pSport1

H0660	Ovary, Cancer: (15799A1F) Poorly differentiated carcinoma	Poorly differentiated carcinoma, ovary			disease	pSport1
H0661	Breast, Cancer: (4004943 A5)	Breast cancer			disease	pSport1
H0662	Breast, Normal: (4005522B2)	Normal Breast - #4005522(B2)	Breast			pSport1
H0663	Breast, Cancer: (4005522 A2)	Breast Cancer - #4005522(A2)	Breast		disease	pSport1
H0664	Breast, Cancer: (9806C012R)	Breast Cancer	Breast		disease	pSport1
H0665	Stromal cells 3.88	Stromal cells 3.88				pSport1
H0666	Ovary, Cancer: (4004332 A2)	Ovarian Cancer, Sample #4004332A2			disease	pSport1
H0667	Stromal cells(HBM3.18)	Stromal cell(HBM 3.18)				pSport1
H0668	stromal cell clone 2.5	stromal cell clone 2.5				pSport1
H0669	Breast, Cancer: (4005385 A2)	Breast Cancer (4005385A2)	Breast			pSport1
H0670	Ovary, Cancer(4004650 A3): Well-Differentiated Micropapillary Serous Carcinoma	Ovarian Cancer - 4004650A3				pSport1
H0671	Breast, Cancer: (9802C02OE)	Breast Cancer- Sample # 9802C02OE				pSport1
H0672	Ovary, Cancer: (4004576 A8)	Ovarian Cancer(4004576A8)	Ovary			pSport1
H0673	Human Prostate Cancer, Stage B2; re-excision	Human Prostate Cancer, stage B2	Prostate			Uni-ZAP XR
H0674	Human Prostate Cancer, Stage C; re-excission	Human Prostate Cancer, stage C	Prostate			Uni-ZAP XR
H0675	Colon, Cancer: (9808C064R)	Colon Cancer 9808C064R				pCMVSport 3.0
H0676	Colon, Cancer: (9808C064R)-total RNA	Colon Cancer 9808C064R				pCMVSport 3.0
H0677	TNFR degenerate oligo	B-Cells				PCRII
H0682	Serous Papillary Adenocarcinoma	serous papillary adenocarcinoma (9606G304SPA3B)				pCMVSport 3.0
H0683	Ovarian Serous Papillary Adenocarcinoma	Serous papillary adenocarcinoma, stage 3C (9804G01				pCMVSport 3.0
H0684	Serous Papillary Adenocarcinoma	Ovarian Cancer-9810G606	Ovaries			pCMVSport 3.0
H0685	Adenocarcinoma of Ovary, Human Cell Line, # OVCAR-3	Adenocarcinoma of Ovary, Human Cell Line, # OVCAR-				pCMVSport 3.0
H0686	Adenocarcinoma of Ovary, Human Cell Line	Adenocarcinoma of Ovary, Human Cell Line, # SW-626				pCMVSport 3.0
H0687	Human normal ovary(#9610G215)	Human normal ovary(#9610G215)	Ovary			pCMVSport 3.0
H0688	Human Ovarian Cancer(#9807G017)	Human Ovarian cancer(#9807G017), mRNA from Maura Ru				pCMVSport 3.0
H0689	Ovarian Cancer	Ovarian Cancer, #9806G019				pCMVSport 3.0
H0690	Ovarian Cancer, # 9702G001	Ovarian Cancer, #9702G001				pCMVSport 3.0

H0691	Normal Ovary, #9710G208	normal ovary, #9710G208				pCMVSport 3.0
H0692	BLyS Receptor from Expression Cloning	B Cell Lymphoma	B Cell			pCMVSport 3.0
H0693	Normal Prostate #ODQ3958EN	Normal Prostate Tissue # ODQ3958EN				pCMVSport 3.0
H0694	Prostate gland adenocarcinoma	Prostate gland, adenocarcinoma, mod/diff, gleason	prostate gland			pCMVSport 3.0
H0695	mononucleocytes from patient	mononucleocytes from patient at Shady Grove Hospit				pCMVSport 3.0
N0003	Human Fetal Brain	Human Fetal Brain				
N0006	Human Fetal Brain	Human Fetal Brain				
N0007	Human Hippocampus	Human Hippocampus				
N0009	Human Hippocampus, prescreened	Human Hippocampus				
S0001	Brain frontal cortex	Brain frontal cortex	Brain			Lambda ZAP II
S0002	Monocyte activated	Monocyte-activated	blood	Cell Line		Uni-ZAP XR
S0003	Human Osteoclastoma	Osteoclastoma	bone		disease	Uni-ZAP XR
S0004	Prostate	Prostate BPH	Prostate			Lambda ZAP II
S0005	Heart	Heart-left ventricle	Heart			pCDNA
S0006	Neuroblastoma	Human Neural Blastoma			disease	pCDNA
S0007	Early Stage Human Brain	Human Fetal Brain				Uni-ZAP XR
S0010	Human Amygdala	Amygdala				Uni-ZAP XR
S0011	STROMAL - OSTEOCLASTOMA	Osteoclastoma	bone		disease	Uni-ZAP XR
S0013	Prostate	Prostate	prostate			Uni-ZAP XR
S0014	Kidney Cortex	Kidney cortex	Kidney			Uni-ZAP XR
S0015	Kidney medulla	Kidney medulla	Kidney			Uni-ZAP XR
S0016	Kidney Pyramids	Kidney pyramids	Kidney			Uni-ZAP XR
S0020	Seven Trans Membrane Receptor Family	7TMD1				
S0021	Whole brain	Whole brain	Brain			ZAP Express
S0022	Human Osteoclastoma Stromal Cells - unamplified	Osteoclastoma Stromal Cells				Uni-ZAP XR
S0023	Human Kidney Cortex - unamplified	Human Kidney Cortex				
S0024	Human Kidney Medulla - unamplified	Human Kidney Medulla				
S0025	Human Kidney Pyramids - unamplified	Human Kidney Pyramids				
S0026	Stromal cell TF274	stromal cell	Bone marrow	Cell Line		Uni-ZAP XR
S0027	Smooth muscle, serum treated	Smooth muscle	Pulmanary artery	Cell Line		Uni-ZAP XR
S0028	Smooth muscle,control	Smooth muscle	Pulmanary artery	Cell Line		Uni-ZAP XR
S0029	brain stem	Brain stem	brain			Uni-ZAP XR
S0030	Brain pons	Brain Pons	Brain			Uni-ZAP XR
S0031	Spinal cord	Spinal cord	spinal cord			Uni-ZAP XR
S0032	Smooth muscle-ILb induced	Smooth muscle	Pulmanary artery	Cell Line		Uni-ZAP XR
S0035	Brain medulla oblongata	Brain medulla oblongata	Brain			Uni-ZAP XR
S0036	Human Substantia Nigra	Human Substantia Nigra				Uni-ZAP XR

S0037	Smooth muscle, IL1b induced	Smooth muscle	Pulmanary artery	Cell Line		Uni-ZAP XR
S0038	Human Whole Brain #2 - Oligo dT > 1.5Kb	Human Whole Brain #2				ZAP Express
S0039	Hypothalamus	Hypothalamus	Brain			Uni-ZAP XR
S0040	Adipocytes	Human Adipocytes from Osteoclastoma				Uni-ZAP XR
S0042	Testes	Human Testes				ZAP Express
S0044	Prostate BPH	prostate BPH	Prostate		disease	Uni-ZAP XR
S0045	Endothelial cells-control	Endothelial cell	endothelial cell-lung	Cell Line		Uni-ZAP XR
S0046	Endothelial-induced	Endothelial cell	endothelial cell-lung	Cell Line		Uni-ZAP XR
S0048	Human Hypothalamus, Alzheimer"s	Human Hypothalamus, Alzheimer"s			disease	Uni-ZAP XR
S0049	Human Brain, Striatum	Human Brain, Striatum				Uni-ZAP XR
S0050	Human Frontal Cortex, Schizophrenia	Human Frontal Cortex, Schizophrenia			disease	Uni-ZAP XR
S0051	Human Hypothalmus,Schizophrenia	Human Hypothalamus, Schizophrenia			disease	Uni-ZAP XR
S0052	neutrophils control	human neutrophils	blood	Cell Line		Uni-ZAP XR
S0053	Neutrophils IL-1 and LPS induced	human neutrophil induced	blood	Cell Line		Uni-ZAP XR
S0106	STRIATUM DEPRESSION		BRAIN		disease	Uni-ZAP XR
S0110	Brain Amygdala Depression		Brain		disease	Uni-ZAP XR
S0112	Hypothalamus		Brain			Uni-ZAP XR
S0114	Anergic T-cell	Anergic T-cell		Cell Line		Uni-ZAP XR
S0116	Bone marrow	Bone marrow	Bone marrow			Uni-ZAP XR
S0118	Smooth muscle control 2	Smooth muscle	Pulmanary artery	Cell Line		Uni-ZAP XR
S0122	Osteoclastoma-normalized A	Osteoclastoma	bone		disease	pBluescript
S0124	Smooth muscle-edited A	Smooth muscle	Pulmanary artery	Cell Line		Uni-ZAP XR
S0126	Osteoblasts	Osteoblasts	Knee	Cell Line		Uni-ZAP XR
S0132	Epithelial-TNFa and INF induced	Airway Epithelial				Uni-ZAP XR
S0134	Apoptotic T-cell	apoptotic cells		Cell Line		Uni-ZAP XR
S0136	PERM TF274	stromal cell	Bone marrow	Cell Line		Lambda ZAP II
S0140	eosinophil-IL5 induced	eosinophil	lung	Cell Line		Uni-ZAP XR
S0142	Macrophage-oxLDL	macrophage-oxidized LDL treated	blood	Cell Line		Uni-ZAP XR
S0144	Macrophage (GM-CSF treated)	Macrophage (GM-CSF treated)				Uni-ZAP XR
S0146	prostate-edited	prostate BPH	Prostate			Uni-ZAP XR
S0148	Normal Prostate	Prostate	prostate			Uni-ZAP XR
S0150	LNCAP prostate cell line	LNCAP Cell Line	Prostate	Cell Line		Uni-ZAP XR
S0152	PC3 Prostate cell line	PC3 prostate cell line				Uni-ZAP XR
S0168	Prostate/LNCAP, subtraction I	PC3 prostate cell line				pBluescript
S0174	Prostate-BPH subtracted II	Human Prostate BPH				pBluescript
S0176	Prostate, normal, subtraction I	Prostate	prostate			Uni-ZAP XR

S0180	Bone Marrow Stroma, TNF&LPS ind	Bone Marrow Stroma, TNF & LPS induced			disease	Uni-ZAP XR
S0182	Human B Cell 8866	Human B- Cell 8866				Uni-ZAP XR
S0184	7TM Receptor enriched, lib II	PBLS, 7TM receptor enriched				Other
S0186	PLBS 7TM receptor, Lib I	PBLS, 7TM receptor enriched				Other
S0188	Prostate,BPH, Lib 2	Human Prostate BPH			disease	pSport1
S0190	Prostate BPH,Lib 2, subtracted	Human Prostate BPH				pSport1
S0192	Synovial Fibroblasts (control)	Synovial Fibroblasts				pSport1
S0194	Synovial hypoxia	Synovial Fibroblasts				pSport1
S0196	Synovial IL-1/TNF stimulated	Synovial Fibroblasts				pSport1
S0206	Smooth Muscle- HASTE normalized	Smooth muscle	Pulmanary artery	Cell Line		pBluescript
S0208	Messangial cell, frac 1	Messangial cell				pSport1
S0210	Messangial cell, frac 2	Messangial cell				pSport1
S0212	Bone Marrow Stromal Cell, untreated	Bone Marrow Stromal Cell,untreated				pSport1
S0214	Human Osteoclastoma, re-excision	Osteoclastoma	bone		disease	Uni-ZAP XR
S0216	Neutrophils IL-1 and LPS induced	human neutrophil induced	blood	Cell Line		Uni-ZAP XR
S0218	Apoptotic T-cell, re-excision	apoptotic cells		Cell Line		Uni-ZAP XR
S0220	H. hypothalamus, frac A;re-excision	Hypothalamus	Brain			ZAP Express
S0222	H. Frontal cortex,epileptic;re-excision	H. Brain, Frontal Cortex, Epileptic	Brain		disease	Uni-ZAP XR
S0242	Synovial Fibroblasts (Il1/TNF), subt	Synovial Fibroblasts				pSport1
S0250	Human Osteoblasts II	Human Osteoblasts	Femur		disease	pCMVSport 2.0
S0254	7TM-PAMIX	PBLS, 7TM receptor enriched				PCRII
S0256	7TM-PHMIX	PBLS, 7TM receptor enriched				PCRII
S0260	Spinal Cord, re-excision	Spinal cord	spinal cord			Uni-ZAP XR
S0268	PRMIX	PRMIX (Human Prostate)	prostate			PCRII
S0270	PTMIX	PTMIX (Human Thymus)	Thymus			PCRII
S0276	Synovial hypoxia-RSF subtracted	Synovial fobroblasts (rheumatoid)	Synovial tissue			pSport1
S0278	H Macrophage (GM-CSF treated), re-excision	Macrophage (GM-CSF treated)				Uni-ZAP XR
S0280	Human Adipose Tissue, re-excision	Human Adipose Tissue				Uni-ZAP XR
S0282	Brain Frontal Cortex, re-excision	Brain frontal cortex	Brain			Lambda ZAP II
S0284	7TMCTT (Testis)	7TMCTP (Placenta)	Testis			PCRII
S0294	Larynx tumor	Larynx tumor	Larynx,vocal cord		disease	pSport1
S0296	Normal lung	Normal lung	Lung			pSport1
S0298	Bone marrow stroma,treated	Bone marrow stroma,treatedSB	Bone marrow			pSport1
S0300	Frontal lobe,dementia;re-	Frontal Lobe	Brain			Uni-ZAP XR

	excision	dementia/Alzheimer's				
S0306	Larynx normal #10 261-273	Larynx normal				pSport1
S0308	Spleen/normal	Spleen normal				pSport1
S0310	Normal trachea	Normal trachea				pSport1
S0312	Human osteoarthritic;fraction II	Human osteoarthritic cartilage			disease	pSport1
S0314	Human osteoarthritis;fraction I	Human osteoarthritic cartilage			disease	pSport1
S0316	Human Normal Cartilage,Fraction I	Human Normal Cartilage				pSport1
S0318	Human Normal Cartilage Fraction II	Human Normal Cartilage				pSport1
S0322	Siebben Polyposis	Siebben Polyposis				pSport1
S0328	Palate carcinoma	Palate carcinoma	Uvula		disease	pSport1
S0330	Palate normal	Palate normal	Uvula			pSport1
S0332	Pharynx carcinoma	Pharynx carcinoma	Hypopharynx			pSport1
S0334	Human Normal Cartilage Fraction III	Human Normal Cartilage				pSport1
S0336	Human Normal Cartilage Fraction IV	Human Normal Cartilage				pSport1
S0338	Human Osteoarthritic Cartilage Fraction III	Human osteoarthritic cartilage			disease	pSport1
S0340	Human Osteoarthritic Cartilage Fraction IV	Human osteoarthritic cartilage			disease	pSport1
S0342	Adipocytes;re-excision	Human Adipocytes from Osteoclastoma				Uni-ZAP XR
S0344	Macrophage-oxLDL; re-excision	macrophage-oxidized LDL treated	blood	Cell Line		Uni-ZAP XR
S0346	Human Amygdala;re-excision	Amygdala				Uni-ZAP XR
S0348	Cheek Carcinoma	Cheek Carcinoma			disease	pSport1
S0350	Pharynx Carcinoma	Pharynx carcinoma	Hypopharynx		disease	pSport1
S0352	Larynx Carcinoma	Larynx carcinoma			disease	pSport1
S0354	Colon Normal II	Colon Normal	Colon			pSport1
S0356	Colon Carcinoma	Colon Carcinoma	Colon		disease	pSport1
S0358	Colon Normal III	Colon Normal	Colon			pSport1
S0360	Colon Tumor II	Colon Tumor	Colon		disease	pSport1
S0362	Human Gastrocnemius	Gastrocnemius muscle				pSport1
S0364	Human Quadriceps	Quadriceps muscle				pSport1
S0366	Human Soleus	Soleus Muscle				pSport1
S0368	Human Pancreatic Langerhans	Islets of Langerhans				pSport1
S0370	Larynx carcinoma II	Larynx carcinoma			disease	pSport1
S0372	Larynx carcinoma III	Larynx carcinoma			disease	pSport1
S0374	Normal colon	Normal colon				pSport1
S0376	Colon Tumor	Colon Tumor			disease	pSport1
S0378	Pancreas normal PCA4 No	Pancreas Normal PCA4 No				pSport1
S0380	Pancreas Tumor PCA4 Tu	Pancreas Tumor PCA4 Tu			disease	pSport1
S0382	Larynx carcinoma IV	Larynx carcinoma			disease	pSport1
S0384	Tongue carcinoma	Tongue carcinoma			disease	pSport1
S0386	Human Whole Brain, re-excision	Whole brain	Brain			ZAP Express

S0388	Human Hypothalamus,schizophrenia, re-excision	Human Hypothalamus, Schizophrenia			disease	Uni-ZAP XR
S0390	Smooth muscle, control; re-excision	Smooth muscle	Pulmanary artery	Cell Line		Uni-ZAP XR
S0392	Salivary Gland	Salivary gland; normal				pSport1
S0394	Stomach;normal	Stomach; normal				pSport1
S0398	Testis; normal	Testis; normal				pSport1
S0400	Brain; normal	Brain; normal				pSport1
S0402	Adrenal Gland,normal	Adrenal gland; normal				pSport1
S0404	Rectum normal	Rectum, normal				pSport1
S0406	Rectum tumour	Rectum tumour				pSport1
S0408	Colon, normal	Colon, normal				pSport1
S0410	Colon, tumour	Colon, tumour				pSport1
S0412	Temporal cortex-Alzheizmer; subtracted	Temporal cortex, alzheimer			disease	Other
S0414	Hippocampus, Alzheimer Subtracted	Hippocampus, Alzheimer Subtracted				Other
S0418	CHME Cell Line;treated 5 hrs	CHME Cell Line; treated				pCMVSport 3.0
S0420	CHME Cell Line,untreated	CHME Cell line, untreatetd				pSport1
S0422	Mo7e Cell Line GM-CSF treated (1ng/ml)	Mo7e Cell Line GM-CSF treated (1ng/ml)				pCMVSport 3.0
S0424	TF-1 Cell Line GM-CSF Treated	TF-1 Cell Line GM-CSF Treated				pSport1
S0426	Monocyte activated; re-excision	Monocyte-activated	blood	Cell Line		Uni-ZAP XR
S0428	Neutrophils control; re-excision	human neutrophils	blood	Cell Line		Uni-ZAP XR
S0430	Aryepiglottis Normal	Aryepiglottis Normal				pSport1
S0432	Sinus piniformis Tumour	Sinus piniformis Tumour				pSport1
S0434	Stomach Normal	Stomach Normal			disease	pSport1
S0436	Stomach Tumour	Stomach Tumour			disease	pSport1
S0438	Liver Normal Met5No	Liver Normal Met5No				pSport1
S0440	Liver Tumour Met 5 Tu	Liver Tumour				pSport1
S0442	Colon Normal	Colon Normal				pSport1
S0444	Colon Tumor	Colon Tumour			disease	pSport1
S0446	Tongue Tumour	Tongue Tumour				pSport1
S0448	Larynx Normal	Larynx Normal				pSport1
S0450	Larynx Tumour	Larynx Tumour				pSport1
S0452	Thymus	Thymus				pSport1
S0454	Placenta	Placenta	Placenta			pSport1
S0456	Tongue Normal	Tongue Normal				pSport1
S0458	Thyroid Normal (SDCA2 No)	Thyroid normal				pSport1
S0460	Thyroid Tumour	Thyroid Tumour				pSport1
S0462	Thyroid Thyroiditis	Thyroid Thyroiditis				pSport1
S0464	Larynx Normal	Larynx Normal				pSport1
S0466	Larynx Tumor	Larynx Tumor			disease	pSport1
S0468	Ea.hy.926 cell line	Ea.hy.926 cell line				pSport1
S0470	Adenocarcinoma	PYFD			disease	pSport1
S0472	Lung Mesothelium	PYBT				pSport1
S0474	Human blood platelets	Platelets	Blood platelets			Other

S0665	Human Amygdala; re-excission	Amygdala				Uni-ZAP XR
S3012	Smooth Muscle Serum Treated, Norm	Smooth muscle	Pulmanary artery	Cell Line		pBluescript
S3014	Smooth muscle, serum induced,re-exc	Smooth muscle	Pulmanary artery	Cell Line		pBluescript
S3020	TH2 cells	TH2 cells				Uni-ZAP XR
S6014	H. hypothalamus, frac A	Hypothalamus	Brain			ZAP Express
S6016	H. Frontal Cortex, Epileptic	H. Brain, Frontal Cortex, Epileptic	Brain		disease	Uni-ZAP XR
S6022	H. Adipose Tissue	Human Adipose Tissue				Uni-ZAP XR
S6024	Alzheimers, spongy change	Alzheimer"s/Spongy change	Brain		disease	Uni-ZAP XR
S6026	Frontal Lobe, Dementia	Frontal Lobe dementia/Alzheimer's	Brain			Uni-ZAP XR
S6028	Human Manic Depression Tissue	Human Manic depression tissue	Brain		disease	Uni-ZAP XR
T0001	Human Brown Fat	Brown Fat				pBluescript SK-
T0002	Activated T-cells	Activated T-Cell, PBL fraction	Blood	Cell Line		pBluescript SK-
T0003	Human Fetal Lung	Human Fetal Lung				pBluescript SK-
T0004	Human White Fat	Human White Fat				pBluescript SK-
T0006	Human Pineal Gland	Human Pinneal Gland				pBluescript SK-
T0007	Colon Epithelium	Colon Epithelium				pBluescriptI SK-
T0008	Colorectal Tumor	Colorectal Tumor			disease	pBluescript SK-
T0010	Human Infant Brain	Human Infant Brain				Other
T0023	Human Pancreatic Carcinoma	Human Pancreatic Carcinoma			disease	pBluescript SK-
T0039	HSA 172 Cells	Human HSA172 cell line				pBluescript SK-
T0040	HSC172 cells	SA172 Cells				pBluescript SK-
T0041	Jurkat T-cell G1 phase	Jurkat T-cell				pBluescript SK-
T0042	Jurkat T-Cell, S phase	Jurkat T-Cell Line				pBluescript SK-
T0047	T lymphocytes >70	T lymphocytes > 70				pBluescript SK-
T0048	Human Aortic Endothelium	Human Aortic Endothilium				pBluescript SK-
T0049	Aorta endothelial cells + TNF-a	Aorta endothelial cells				pBluescript SK-
T0060	Human White Adipose	Human White Fat				pBluescript SK-
T0067	Human Thyroid	Human Thyroid				pBluescript SK-
T0068	Normal Ovary, Premenopausal	Normal Ovary, Premenopausal				pBluescript SK-
T0069	Human Uterus, normal	Human Uterus, normal				pBluescript SK-
T0071	Human Bone Marrow	Human Bone Marrow				pBluescript SK-
T0074	Human Adult Retina	Human Adult Retina				pBluescriptI SK-
T0078	Human Liver, normal	Human Liver,				pBluescript

	adult	normal Adult				SK-
T0079	Human Kidney, normal Adult	Human Kidney, normal Adult				pBluescript SK-
T0082	Human Adult Retina	Human Adult Retina				pBluescript SK-
T0086	Human Pancreatic Carcinoma – Screened	Human Pancreatic Carcinoma			disease	pBluescript SK-
T0090	Liver, normal					pBluescript SK-
T0103	Human colon carcinoma (HCC) cell line					pBluescript SK-
T0104	HCC cell line metastisis to liver					pBluescript SK-
T0109	Human (HCC) cell line liver (mouse) metastasis, remake					pBluescript SK-
T0110	Human colon carcinoma (HCC) cell line, remake					pBluescript SK-
T0112	Human (Caco-2) cell line, adenocarcinoma, colon					pBluescript SK-
T0114	Human (Caco-2) cell line, adenocarcinoma, colon, remake					pBluescript SK-
T0115	Human Colon Carcinoma (HCC) cell line					pBluescript SK-
L0002	Atrium cDNA library Human heart					
L0004	ClonTech HL 1065a					
L0005	Clontech human aorta polyA+ mRNA (#6572)					
L0009	EST from 8p21.3-p22					
L0011	GM10791 library (Eric D. Green)					
L0015	Human					
L0017	Human (J. Swensen)					
L0021	Human adult (K.Okubo)					
L0022	Human adult lung 3" directed MboI cDNA					
L0024	Human brain ARSanders					
L0031	Human chromosome 11q23 mRNA (M.Katoh)					
L0032	Human chromosome 12p cDNAs					
L0033	Human chromosome 13q14 cDNA					
L0037	Human chromosome 5q31-q33 mRNA					
L0040	Human colon mucosa					
L0041	Human epidermal keratinocyte					
L0043	Human HaCaT keratinocyte cDNA					
L0045	Human keratinocyte differential display (B.Lin)					
L0052	Human normalized K562-cDNA					
L0053	Human pancreatic tumor					
L0055	Human promyelocyte					
L0060	Human thymus NSTH II					
L0065	Liver HepG2 cell line.					
L0070	Selected chromosome 21 cDNA library					

L0096	Subtracted human retina					
L0097	Subtracted human retinal pigment epithelium (RPE)					
L0103	DKFZphamy1	amygdala				
L0105	Human aorta polyA+ (TFujiwara)	aorta				
L0109	Human brain cDNA	brain				
L0116	Human fetal brain (Zakharev,V.M. and Belyavsky,A.V.)	brain				
L0118	Human fetal brain S. Meier-Ewert	brain				
L0126	Human fibroblast cDNA	fibroblast				
L0142	Human placenta cDNA (TFujiwara)	placenta				
L0143	Human placenta polyA+ (TFujiwara)	placenta				
L0145	Human retina (D.Swanson)	retina				
L0149	DKFZphsnu1	subthalamic nucleus				
L0151	Human testis (C. De Smet)	testis				
L0157	Human fetal brain (TFujiwara)		brain			
L0163	Human heart cDNA (YNakamura)		heart			
L0171	Human lung adenocarcinoma A549	lung adenocarcinoma		A549		
L0177	Human newborn melanocytes (T.Vogt)			Clonetics Corp. (San Diego, CA) strain #68 and 2486		
L0183	Human HeLa cells (M.Lovett)			HeLa		
L0194	Human pancreatic cancer cell line Patu 8988t	pancreatic cancer		Patu 8988t		
L0251	Homo sapiens laryngeal cancer	laryngeal cancer				
L0307	Human C3-A11N			C3-A11N; clonally related variant of OCI LY8-C3P		
L0351	Infant brain, Bento Soares					BA, M13-derived
L0352	Normalized infant brain, Bento Soares					BA, M13-derived
L0355	P, Human foetal Brain Whole tissue					Bluescript
L0356	S, Human foetal Adrenals tissue					Bluescript
L0361	Stratagene ovary (#937217)		ovary			Bluescript SK
L0362	Stratagene ovarian cancer (#937219)					Bluescript SK-
L0363	NCI_CGAP_GC2	germ cell tumor				Bluescript SK-
L0364	NCI_CGAP_GC5	germ cell tumor				Bluescript

						SK-
L0366	Stratagene schizo brain S11	schizophrenic brain S-11 frontal lobe				Bluescript SK-
L0367	NCI_CGAP_Sch1	Schwannoma tumor				Bluescript SK-
L0368	NCI_CGAP_SS1	synovial sarcoma				Bluescript SK-
L0369	NCI_CGAP_AA1	adrenal adenoma	adrenal gland			Bluescript SK-
L0370	Johnston frontal cortex	pooled frontal lobe	brain			Bluescript SK-
L0371	NCI_CGAP_Br3	breast tumor	breast			Bluescript SK-
L0372	NCI_CGAP_Co12	colon tumor	colon			Bluescript SK-
L0373	NCI_CGAP_Co11	tumor	colon			Bluescript SK-
L0374	NCI_CGAP_Co2	tumor	colon			Bluescript SK-
L0375	NCI_CGAP_Kid6	kidney tumor	kidney			Bluescript SK-
L0376	NCI_CGAP_Lar1	larynx	larynx			Bluescript SK-
L0378	NCI_CGAP_Lu1	lung tumor	lung			Bluescript SK-
L0379	NCI_CGAP_Lym3	lymphoma	lymph node			Bluescript SK-
L0381	NCI_CGAP_HN4	squamous cell carcinoma	pharynx			Bluescript SK-
L0382	NCI_CGAP_Pr25	epithelium (cell line)	prostate			Bluescript SK-
L0383	NCI_CGAP_Pr24	invasive tumor (cell line)	prostate			Bluescript SK-
L0384	NCI_CGAP_Pr23	prostate tumor	prostate			Bluescript SK-
L0385	NCI_CGAP_Gas1	gastric tumor	stomach			Bluescript SK-
L0386	NCI_CGAP_HN3	squamous cell carcinoma from base of tongue	tongue			Bluescript SK-
L0387	NCI_CGAP_GCB0	germinal center B-cells	tonsil			Bluescript SK-
L0388	NCI_CGAP_HN6	normal gingiva (cell line from immortalized kerati				Bluescript SK-
L0389	NCI_CGAP_HN5	normal gingiva (cell line from primary keratinocyt				Bluescript SK-
L0393	B, Human Liver tissue					gt11
L0394	H, Human adult Brain Cortex tissue					gt11
L0404	b4HB3MA Cot109+103+85-Bio					Lafmid A
L0407	b4HB3MA Cot18-Bio					Lafmid A
L0411	1-NIB					Lafmid BA
L0415	b4HB3MA Cot8-HAP-Ft					Lafmid BA
L0416	b4HB3MA-Cot0.38-HAP-B					Lafmid BA
L0418	b4HB3MA-Cot109+10-Bio					Lafmid BA
L0426	b4HB3MA-Cot51.5-HAP-Ft					Lafmid BA
L0427	b4HB3MA-FT20%-Biotin					Lafmid BA

L0428	Cot1374Ft-4HB3MA					Lafmid BA
L0429	Cot250Ft b4HB3MA					Lafmid BA
L0430	Cot250Ft-b4HB3MA					Lafmid BA
L0435	Infant brain, LLNL array of Dr. M. Soares 1NIB					lafmid BA
L0438	normalized infant brain cDNA	total brain	brain			lafmid BA
L0439	Soares infant brain 1NIB		whole brain			Lafmid BA
L0443	b4HB3MK					Lafmid BK
L0444	HB3MK					Lafmid BK
L0448	3HFLSK20					Lafmid K
L0451	N3HFLSK20					Lafmid K
L0454	Clontech adult human fat cell library HL1108A					lambda gt10
L0455	Human retina cDNA randomly primed sublibrary	retina	eye			lambda gt10
L0456	Human retina cDNA Tsp509I-cleaved sublibrary	retina	eye			lambda gt10
L0459	Adult heart, Clontech					Lambda gt11
L0460	Adult heart, Lambda gt11					Lambda gt11
L0462	WATM1					lambda gt11
L0465	TEST1, Human adult Testis tissue					lambda nm1149
L0467	Fetal heart, Lambda ZAP Express					Lambda ZAP
L0468	HE6W					lambda zap
L0469	T, Human adult Rhabdomyosarcoma cell-line					Lambda Zap
L0470	BL29 Burkitt"s lymphoma, Pascalis Sideras					lambda ZAP 2
L0471	Human fetal heart, Lambda ZAP Express					Lambda ZAP Express
L0475	KG1-a Lambda Zap Express cDNA library			KG1-a		Lambda Zap Express (Stratagene)
L0476	Fetal brain, Stratagene					Lambda ZAP II
L0477	HPLA CCLee	placenta				Lambda ZAP II
L0480	Stratagene cat#937212 (1992)					Lambda ZAP, pBluescript SK(-)
L0481	CD34+DIRECTIONAL					Lambda ZAPII
L0482	HT29M6					Lambda ZAPII
L0483	Human pancreatic islet					Lambda ZAPII
L0485	STRATAGENE Human skeletal muscle cDNA library, cat. #936215.	skeletal muscle	leg muscle			Lambda ZAPII
L0493	NCI_CGAP_Ov26	papillary serous carcinoma	ovary			pAMP1
L0497	NCI_CGAP_HSC4	CD34+, CD38- from normal bone marrow donor	bone marrow			pAMP1
L0498	NCI_CGAP_HSC3	CD34+, T negative, patient with chronic	bone marrow			pAMP1

		myelogenou				
L0499	NCI_CGAP_HSC2	stem cell 34+/38+	bone marrow			pAMP1
L0500	NCI_CGAP_Brn20	oligodendroglioma	brain			pAMP1
L0501	NCI_CGAP_Brn21	oligodendroglioma	brain			pAMP1
L0502	NCI_CGAP_Br15	adenocarcinoma	breast			pAMP1
L0504	NCI_CGAP_Br13	breast carcinoma in situ	breast			pAMP1
L0505	NCI_CGAP_Br12	invasive carcinoma	breast			pAMP1
L0506	NCI_CGAP_Br16	lobullar carcinoma in situ	breast			pAMP1
L0507	NCI_CGAP_Br14	normal epithelium	breast			pAMP1
L0508	NCI_CGAP_Lu25	bronchioalveolar carcinoma	lung			pAMP1
L0509	NCI_CGAP_Lu26	invasive adenocarcinoma	lung			pAMP1
L0510	NCI_CGAP_Ov33	borderline ovarian carcinoma	ovary			pAMP1
L0511	NCI_CGAP_Ov34	borderline ovarian carcinoma	ovary			pAMP1
L0512	NCI_CGAP_Ov36	borderline ovarian carcinoma	ovary			pAMP1
L0513	NCI_CGAP_Ov37	early stage papillary serous carcinoma	ovary			pAMP1
L0514	NCI_CGAP_Ov31	papillary serous carcinoma	ovary			pAMP1
L0515	NCI_CGAP_Ov32	papillary serous carcinoma	ovary			pAMP1
L0517	NCI_CGAP_Pr1					pAMP10
L0518	NCI_CGAP_Pr2					pAMP10
L0519	NCI_CGAP_Pr3					pAMP10
L0520	NCI_CGAP_Alv1	alveolar rhabdomyosarcoma				pAMP10
L0521	NCI_CGAP_Ew1	Ewing"s sarcoma				pAMP10
L0522	NCI_CGAP_Kid1	kidney				pAMP10
L0523	NCI_CGAP_Lip2	liposarcoma				pAMP10
L0524	NCI_CGAP_Li1	liver				pAMP10
L0525	NCI_CGAP_Li2	liver				pAMP10
L0526	NCI_CGAP_Pr12	metastatic prostate bone lesion				pAMP10
L0527	NCI_CGAP_Ov2	ovary				pAMP10
L0528	NCI_CGAP_Pr5	prostate				pAMP10
L0529	NCI_CGAP_Pr6	prostate				pAMP10
L0530	NCI_CGAP_Pr8	prostate				pAMP10
L0531	NCI_CGAP_Pr20	prostate metastasis, liver				pAMP10
L0532	NCI_CGAP_Thy1	thyroid				pAMP10
L0533	NCI_CGAP_HSC1	stem cells	bone marrow			pAMP10
L0534	Chromosome 7 Fetal Brain cDNA Library	brain	brain			pAMP10
L0535	NCI_CGAP_Br5	infiltrating ductal carcinoma	breast			pAMP10
L0536	NCI_CGAP_Br4	normal ductal tissue	breast			pAMP10
L0537	NCI_CGAP_Ov6	normal cortical stroma	ovary			pAMP10
L0539	Chromosome 7 Placental cDNA Library		placenta			pAMP10
L0540	NCI_CGAP_Pr10	invasive prostate tumor	prostate			pAMP10
L0541	NCI_CGAP_Pr7	low-grade prostatic neoplasia	prostate			pAMP10
L0542	NCI_CGAP_Pr11	normal prostatic epithelial cells	prostate			pAMP10

L0543	NCI_CGAP_Pr9	normal prostatic epithelial cells	prostate			pAMP10
L0544	NCI_CGAP_Pr4	prostatic intraepithelial neoplasia - high grade	prostate			pAMP10
L0545	NCI_CGAP_Pr4.1	prostatic intraepithelial neoplasia - high grade	prostate			pAMP10
L0546	NCI_CGAP_Pr18	stroma	prostate			pAMP10
L0547	NCI_CGAP_Pr16	tumor	prostate			pAMP10
L0549	NCI_CGAP_HN10	carcinoma in situ from retromolar trigone				pAMP10
L0550	NCI_CGAP_HN9	normal squamous epithelium from retromolar trigone				pAMP10
L0551	NCI_CGAP_HN7	normal squamous epithelium, floor of mouth				pAMP10
L0552	NCI_CGAP_HN8	well-differentiated invasive carcinoma, floor of m				pAMP10
L0554	NCI_CGAP_Li8		liver			pAMP10
L0555	NCI_CGAP_Lu34	large cell carcinoma	lung			pAMP10
L0557	NCI_CGAP_Lu21	small cell carcinoma	lung			pAMP10
L0558	NCI_CGAP_Ov40	endometrioid ovarian metastasis	ovary			pAMP10
L0559	NCI_CGAP_Ov39	papillary serous ovarian metastasis	ovary			pAMP10
L0560	NCI_CGAP_HN12	moderate to poorly differentiated invasive carcino	tongue			pAMP10
L0561	NCI_CGAP_HN11	normal squamous epithelium	tongue			pAMP10
L0562	Chromosome 7 HeLa cDNA Library			HeLa cell line; ATCC		pAMP10
L0563	Human Bone Marrow Stromal Fibroblast	bone marrow				pBluescript
L0564	Jia bone marrow stroma	bone marrow stroma				pBluescript
L0565	Normal Human Trabecular Bone Cells	Bone	Hip			pBluescript
L0581	Stratagene liver (#937224)		liver			pBluescript SK
L0583	Stratagene cDNA library Human fibroblast, cat#937212					pBluescript SK(+)
L0584	Stratagene cDNA library Human heart, cat#936208					pBluescript SK(+)
L0586	HTCDL1					pBluescript SK(-)
L0587	Stratagene colon HT29 (#937221)					pBluescript SK-
L0588	Stratagene endothelial cell 937223					pBluescript SK-
L0589	Stratagene fetal retina 937202					pBluescript SK-
L0590	Stratagene fibroblast (#937212)					pBluescript SK-
L0591	Stratagene HeLa cell s3 937216					pBluescript SK-

L0592	Stratagene hNT neuron (#937233)					pBluescript SK-
L0593	Stratagene neuroepithelium (#937231)					pBluescript SK-
L0594	Stratagene neuroepithelium NT2RAMI 937234					pBluescript SK-
L0595	Stratagene NT2 neuronal precursor 937230	neuroepithelial cells	brain			pBluescript SK-
L0596	Stratagene colon (#937204)		colon			pBluescript SK-
L0597	Stratagene corneal stroma (#937222)		cornea			pBluescript SK-
L0598	Morton Fetal Cochlea	cochlea	ear			pBluescript SK-
L0599	Stratagene lung (#937210)		lung			pBluescript SK-
L0600	Weizmann Olfactory Epithelium	olfactory epithelium	nose			pBluescript SK-
L0601	Stratagene pancreas (#937208)		pancreas			pBluescript SK-
L0602	Pancreatic Islet	pancreatic islet	pancreas			pBluescript SK-
L0603	Stratagene placenta (#937225)		placenta			pBluescript SK-
L0604	Stratagene muscle 937209	muscle	skeletal muscle			pBluescript SK-
L0605	Stratagene fetal spleen (#937205)	fetal spleen	spleen			pBluescript SK-
L0606	NCI_CGAP_Lym5	follicular lymphoma	lymph node			pBluescript SK-
L0607	NCI_CGAP_Lym6	mantle cell lymphoma	lymph node			pBluescript SK-
L0608	Stratagene lung carcinoma 937218	lung carcinoma	lung	NCI-H69		pBluescript SK-
L0609	Schiller astrocytoma	astrocytoma	brain			pBluescript SK- (Stratagene)
L0610	Schiller glioblastoma multiforme	glioblastoma multiforme	brain			pBluescript SK- (Stratagene)
L0611	Schiller meningioma	meningioma	brain			pBluescript SK- (Stratagene)
L0612	Schiller oligodendroglioma	oligodendroglioma	brain			pBluescript SK- (Stratagene)
L0615	22 week old human fetal liver cDNA library					pBluescriptII SK(-)
L0617	Chromosome 22 exon					pBluescriptII KS+
L0619	Chromosome 9 exon II					pBluescriptII KS+
L0622	HM1					pcDNAII (Invitrogen)
L0623	HM3	pectoral muscle (after mastectomy)				pcDNAII (Invitrogen)
L0626	NCI_CGAP_GC1	bulk germ cell seminoma				pCMV-SPORT2
L0627	NCI_CGAP_Col	bulk tumor	colon			pCMV-SPORT2
L0628	NCI_CGAP_Ov1	ovary bulk tumor	ovary			pCMV-

						SPORT2
L0629	NCI_CGAP_Mel3	metastatic melanoma to bowel	bowel (skin primary)			pCMV-SPORT4
L0630	NCI_CGAP_CNS1	substantia nigra	brain			pCMV-SPORT4
L0631	NCI_CGAP_Br7		breast			pCMV-SPORT4
L0632	NCI_CGAP_Li5	hepatic adenoma	liver			pCMV-SPORT4
L0633	NCI_CGAP_Lu6	small cell carcinoma	lung			pCMV-SPORT4
L0634	NCI_CGAP_Ov8	serous adenocarcinoma	ovary			pCMV-SPORT4
L0635	NCI_CGAP_PNS1	dorsal root ganglion	peripheral nervous system			pCMV-SPORT4
L0636	NCI_CGAP_Pit1	four pooled pituitary adenomas	brain			pCMV-SPORT6
L0637	NCI_CGAP_Brn53	three pooled meningiomas	brain			pCMV-SPORT6
L0638	NCI_CGAP_Brn35	tumor, 5 pooled (see description)	brain			pCMV-SPORT6
L0639	NCI_CGAP_Brn52	tumor, 5 pooled (see description)	brain			pCMV-SPORT6
L0640	NCI_CGAP_Br18	four pooled high-grade tumors, including two prima	breast			pCMV-SPORT6
L0641	NCI_CGAP_Co17	juvenile granulosa tumor	colon			pCMV-SPORT6
L0642	NCI_CGAP_Co18	moderately differentiated adenocarcinoma	colon			pCMV-SPORT6
L0643	NCI_CGAP_Co19	moderately differentiated adenocarcinoma	colon			pCMV-SPORT6
L0644	NCI_CGAP_Co20	moderately differentiated adenocarcinoma	colon			pCMV-SPORT6
L0645	NCI_CGAP_Co21	moderately differentiated adenocarcinoma	colon			pCMV-SPORT6
L0646	NCI_CGAP_Co14	moderately-differentiated adenocarcinoma	colon			pCMV-SPORT6
L0647	NCI_CGAP_Sar4	five pooled sarcomas, including myxoid liposarcoma	connective tissue			pCMV-SPORT6
L0648	NCI_CGAP_Eso2	squamous cell carcinoma	esophagus			pCMV-SPORT6
L0649	NCI_CGAP_GU1	2 pooled high-grade transitional cell tumors	genitourinary tract			pCMV-SPORT6
L0650	NCI_CGAP_Kid13	2 pooled Wilms" tumors, one primary and one metast	kidney			pCMV-SPORT6
L0651	NCI_CGAP_Kid8	renal cell tumor	kidney			pCMV-SPORT6
L0652	NCI_CGAP_Lu27	four pooled poorly-differentiated adenocarcinomas	lung			pCMV-SPORT6
L0653	NCI_CGAP_Lu28	two pooled squamous cell carcinomas	lung			pCMV-SPORT6

L0654	NCI_CGAP_Lu31		lung, cell line			pCMV-SPORT6
L0655	NCI_CGAP_Lym12	lymphoma, follicular mixed small and large cell	lymph node			pCMV-SPORT6
L0656	NCI_CGAP_Ov38	normal epithelium	ovary			pCMV-SPORT6
L0657	NCI_CGAP_Ov23	tumor, 5 pooled (see description)	ovary			pCMV-SPORT6
L0658	NCI_CGAP_Ov35	tumor, 5 pooled (see description)	ovary			pCMV-SPORT6
L0659	NCI_CGAP_Pan1	adenocarcinoma	pancreas			pCMV-SPORT6
L0661	NCI_CGAP_Mel15	malignant melanoma, metastatic to lymph node	skin			pCMV-SPORT6
L0662	NCI_CGAP_Gas4	poorly differentiated adenocarcinoma with signet r	stomach			pCMV-SPORT6
L0663	NCI_CGAP_Ut2	moderately-differentiated endometrial adenocarcino	uterus			pCMV-SPORT6
L0664	NCI_CGAP_Ut3	poorly-differentiated endometrial adenocarcinoma,	uterus			pCMV-SPORT6
L0665	NCI_CGAP_Ut4	serous papillary carcinoma, high grade, 2 pooled t	uterus			pCMV-SPORT6
L0666	NCI_CGAP_Ut1	well-differentiated endometrial adenocarcinoma, 7	uterus			pCMV-SPORT6
L0667	NCI_CGAP_CML1	myeloid cells, 18 pooled CML cases, BCR/ABL rearra	whole blood			pCMV-SPORT6
L0669	Human MCF7 cDNA subtracted with MDA-MB-231 cDNA	breast adenocarcinoma	breast	MCF7		pCR II [Invitrogen]
L0684	Stanley Frontal SB pool 1	frontal lobe (see description)	brain			pCR2.1-TOPO (Invitrogen)
L0685	Stanley Frontal SN pool 1	frontal lobe (see description)	brain			pCR2.1-TOPO (Invitrogen)
L0686	Stanley Frontal SN pool 2	frontal lobe (see description)	brain			pCR2.1-TOPO (Invitrogen)
L0688	Stanley Hippocampus SB pool 1	hippocampus (see description)	brain			pCR2.1-TOPO (Invitrogen)
L0695	Human Glialblastoma Cell		Brain	BT-325		PCRII, Invitrogen
L0697	Testis 1					PGEM 5zf(+)
L0698	Testis 2					PGEM 5zf(+)
L0700	Outward Alu-primed hncDNA library					pGEM-3Z
L0717	Gessler Wilms tumor					pSPORT1
L0718	Testis 5					pSPORT1
L0719	human embryo cDNA library	Whole embryo				pSPORT1

L0731	Soares_pregnant_uterus_NbHPU		uterus			pT7T3-Pac
L0738	Human colorectal cancer					pT7T3D
L0740	Soares melanocyte 2NbHM	melanocyte				pT7T3D (Pharmacia) with a modified polylinker
L0741	Soares adult brain N2b4HB55Y		brain			pT7T3D (Pharmacia) with a modified polylinker
L0742	Soares adult brain N2b5HB55Y		brain			pT7T3D (Pharmacia) with a modified polylinker
L0743	Soares breast 2NbHBst		breast			pT7T3D (Pharmacia) with a modified polylinker
L0744	Soares breast 3NbHBst		breast			pT7T3D (Pharmacia) with a modified polylinker
L0745	Soares retina N2b4HR	retina	eye			pT7T3D (Pharmacia) with a modified polylinker
L0746	Soares retina N2b5HR	retina	eye			pT7T3D (Pharmacia) with a modified polylinker
L0747	Soares_fetal_heart_NbHH 19W		heart			pT7T3D (Pharmacia) with a modified polylinker
L0748	Soares fetal liver spleen 1NFLS		Liver and Spleen			pT7T3D (Pharmacia) with a modified polylinker
L0749	Soares_fetal_liver_spleen _1NFLS_S1		Liver and Spleen			pT7T3D (Pharmacia) with a modified polylinker
L0750	Soares_fetal_lung_NbHL1 9W		lung			pT7T3D (Pharmacia) with a modified polylinker
L0751	Soares ovary tumor NbHOT	ovarian tumor	ovary			pT7T3D (Pharmacia) with a modified polylinker
L0752	Soares_parathyroid_tumor	parathyroid tumor	parathyroid			pT7T3D

	_NbHPA		gland			(Pharmacia) with a modified polylinker
L0753	Soares_pineal_gland_N3HPG		pineal gland			pT7T3D (Pharmacia) with a modified polylinker
L0754	Soares placenta Nb2HP		placenta			pT7T3D (Pharmacia) with a modified polylinker
L0755	Soares_placenta_8to9weeks_2NbHP8to9W		placenta			pT7T3D (Pharmacia) with a modified polylinker
L0756	Soares_multiple_sclerosis_2NbHMSP	multiple sclerosis lesions				pT7T3D (Pharmacia) with a modified polylinker V_TYPE
L0757	Soares_senescent_fibroblasts_NbHSF	senescent fibroblast				pT7T3D (Pharmacia) with a modified polylinker V_TYPE
L0758	Soares_testis_NHT					pT7T3D-Pac (Pharmacia) with a modified polylinker
L0759	Soares_total_fetus_Nb2HF8_9w.					pT7T3D-Pac (Pharmacia) with a modified polylinker
L0760	Barstead aorta HPLRB3	aorta				pT7T3D-Pac (Pharmacia) with a modified polylinker
L0761	NCI_CGAP_CLL1	B-cell, chronic lymphotic leukemia				pT7T3D-Pac (Pharmacia) with a modified polylinker
L0762	NCI_CGAP_Br1.1	breast				pT7T3D-Pac (Pharmacia) with a modified polylinker
L0763	NCI_CGAP_Br2	breast				pT7T3D-Pac (Pharmacia) with a modified polylinker
L0764	NCI_CGAP_Co3	colon				pT7T3D-Pac (Pharmacia) with a

						modified polylinker
L0765	NCI_CGAP_Co4	colon				pT7T3D-Pac (Pharmacia) with a modified polylinker
L0766	NCI_CGAP_GCB1	germinal center B cell				pT7T3D-Pac (Pharmacia) with a modified polylinker
L0767	NCI_CGAP_GC3	pooled germ cell tumors				pT7T3D-Pac (Pharmacia) with a modified polylinker
L0768	NCI_CGAP_GC4	pooled germ cell tumors				pT7T3D-Pac (Pharmacia) with a modified polylinker
L0769	NCI_CGAP_Brn25	anaplastic oligodendroglioma	brain			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0770	NCI_CGAP_Brn23	glioblastoma (pooled)	brain			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0771	NCI_CGAP_Co8	adenocarcinoma	colon			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0772	NCI_CGAP_Co10	colon tumor RER+	colon			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0773	NCI_CGAP_Co9	colon tumor RER+	colon			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0774	NCI_CGAP_Kid3		kidney			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0775	NCI_CGAP_Kid5	2 pooled tumors (clear cell type)	kidney			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0776	NCI_CGAP_Lu5	carcinoid	lung			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0777	Soares_NhHMPu_S1	Pooled human melanocyte, fetal	mixed (see below)			pT7T3D-Pac (Pharmacia)

		heart, and pregnant				with a modified polylinker
L0778	Barstead pancreas HPLRB1		pancreas			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0779	Soares_NFL_T_GBC_S1		pooled			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0780	Soares_NSF_F8_9W_OT_PA_P_S1		pooled			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0782	NCI_CGAP_Pr21	normal prostate	prostate			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0783	NCI_CGAP_Pr22	normal prostate	prostate			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0784	NCI_CGAP_Lei2	leiomyosarcoma	soft tissue			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0785	Barstead spleen HPLRB2		spleen			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0786	Soares_NbHFB		whole brain			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0787	NCI_CGAP_Sub1					pT7T3D-Pac (Pharmacia) with a modified polylinker
L0788	NCI_CGAP_Sub2					pT7T3D-Pac (Pharmacia) with a modified polylinker
L0789	NCI_CGAP_Sub3					pT7T3D-Pac (Pharmacia) with a modified polylinker
L0790	NCI_CGAP_Sub4					pT7T3D-Pac (Pharmacia) with a modified polylinker
L0791	NCI_CGAP_Sub5					pT7T3D-Pac

						(Pharmacia) with a modified polylinker
L0792	NCI_CGAP_Sub6					pT7T3D-Pac (Pharmacia) with a modified polylinker
L0793	NCI_CGAP_Sub7					pT7T3D-Pac (Pharmacia) with a modified polylinker
L0794	NCI_CGAP_GC6	pooled germ cell tumors				pT7T3D-Pac (Pharmacia) with a modified polylinker
L0796	NCI_CGAP_Brn50	medulloblastoma	brain			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0800	NCI_CGAP_Co16	colon tumor, RER+	colon			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0803	NCI_CGAP_Kid11		kidney			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0804	NCI_CGAP_Kid12	2 pooled tumors (clear cell type)	kidney			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0805	NCI_CGAP_Lu24	carcinoid	lung			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0806	NCI_CGAP_Lu19	squamous cell carcinoma, poorly differentiated (4	lung			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0807	NCI_CGAP_Ov18	fibrotheoma	ovary			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0808	Barstead prostate BPH HPLRB4 1		prostate			pT7T3D-Pac (Pharmacia) with a modified polylinker
L0809	NCI_CGAP_Pr28		prostate			pT7T3D-Pac (Pharmacia) with a modified polylinker

L0811	BATM2					PTZ18
L2244	Human Fetal Brain+Liver+Heart		Brain, Liver, Heart			pUC19
L2250	Human cerebral cortex	cerebral cortex				
L2251	Human fetal lung	Fetal lung				
L2269	NCI_CGAP_Thy11	follicular carcinoma	thyroid			pAMP10
L3872	NCI_CGAP_Skn1		skin, normal, 4 pooled sa			pCMV-SPORT6
L3904	NCI_CGAP_Brn64	glioblastoma with EGFR amplification	brain			pCMV-SPORT6
L3905	NCI_CGAP_Brn67	anaplastic oligodendroglioma with 1p/19q loss	brain			pCMV-SPORT6
L4497	NCI_CGAP_Br22	invasive ductal carcinoma, 3 pooled samples	breast			pCMV-SPORT6
L4500	NCI_CGAP_HN16	moderate to poorly differentiated invasive carcino	mouth			pAMP10
L4501	NCI_CGAP_Sub8					pT7T3D-Pac (Pharmacia) with a modified polylinker
L4507	NCI_CGAP_Thy6	normal epithelium	thyroid			pAMP10
L4508	NCI_CGAP_Thy8	normal epithelium	thyroid			pAMP10
L4556	NCI_CGAP_HN13	squamous cell carcinoma	tongue			pCMV-SPORT6
L4559	NCI_CGAP_Thy3	follicular carcinoma	thyroid			pCMV-SPORT6
L4669	NCI_CGAP_Ov41	serous papillary tumor	ovary			pCMV-SPORT6
L4747	NCI_CGAP_Brn41	oligodendroglioma	brain			pT7T3D-Pac (Pharmacia) with a modified polylinker
L5286	NCI_CGAP_Thy10	medullary carcinoma	thyroid			pAMP10
L5564	NCI_CGAP_HN20		normal head/neck tissue			pAMP1
L5565	NCI_CGAP_Brn66	glioblastoma with probably TP53 mutation and witho	brain			pCMV-SPORT6
L5566	NCI_CGAP_Brn70	anaplastic oligodendroglioma	brain			pCMV-SPORT6.ccdb
L5568	NCI_CGAP_HN21	nasopharyngeal carcinoma	head/neck			pAMP1
L5569	NCI_CGAP_HN17	normal epithelium	nasopharynx			pAMP10
L5574	NCI_CGAP_HN19	normal epithelium	nasopharynx			pAMP10
L5575	NCI_CGAP_Brn65	glioblastoma without EGFR amplification	brain			pCMV-SPORT6
L5622	NCI_CGAP_Skn3		skin			pCMV-SPORT6
L5623	NCI_CGAP_Skn4	squamous cell carcinoma	skin			pCMV-SPORT6

TABLE 5

OMIM Reference	Description
100710	Myasthenic syndrome, slow-channel congenital, 601462
102200	Somatotrophinoma
102540	Cardiomyopathy, idiopathic dilated
102770	Myoadenylate deaminase deficiency
103000	Hemolytic anemia due to adenylate kinase deficiency
103050	Autism, succinylpurinemic
103050	Adenylosuccinase deficiency
103581	Albright hereditary osteodystrophy-2
103600	[Dysalbuminemic hyperthyroxinemia]
103600	[Dysalbuminemic hyperzincemia], 194470
103600	Analbuminemia
103850	Aldolase A deficiency
104150	[AFP deficiency, congenital]
104150	[Hereditary persistence of alpha-fetoprotein]
104311	Alzheimer disease-3
104500	Amelogenesis imperfecta-2, hypoplastic local type
104770	Amyloidosis, secondary, susceptibility to
106100	Angioedema, hereditary
106165	Hypertension, essential, 145500
106180	Myocardial infarction, susceptibility to
106300	Ankylosing spondylitis
107280	Cerebrovascular disease, occlusive
107280	Alpha-1-antichymotrypsin deficiency
107300	Antithrombin III deficiency
107400	Emphysema
107400	Emphysema-cirrhosis
107470	Atypical mycobacterial infection, familial disseminated, 209950
107470	BCG infection, generalized familial
107470	Tuberculosis, susceptibility to
107670	Apolipoprotein A-II deficiency
107741	Hyperlipoproteinemia, type III
107777	Diabetes insipidus, nephrogenic, autosomal recessive, 222000
108725	Atherosclerosis, susceptibility to
108730	Brody myopathy, 601003
108800	Atrial septal defect, secundum type
108962	Hypertension, salt-resistant
109150	Machado-Joseph disease
109270	Renal tubular acidosis, distal, 179800
109270	Spherocytosis, hereditary
109270	[Acanthocytosis, one form]
109270	[Elliptocytosis, Malaysian-Melanesian type]
109270	Hemolytic anemia due to band 3 defect
109560	Leukemia/lymphoma, B-cell, 3

110700	Vivax malaria, susceptibility to
112410	Hypertension with brachydactyly
113520	Hyperleucinemia-isoleucinemia or hypervalinemia
113900	Heart block, progressive familial, type I
114240	Muscular dystrophy, limb-girdle, type 2A, 253600
114350	Leukemia, acute myeloid
114835	Monocyte carboxyesterase deficiency
115660	Cataract, cerulean, type 1
116806	Colorectal cancer
117700	[Hypoceruloplasminemia, hereditary]
117700	Hemosiderosis, systemic, due to aceruloplasminemia
118210	Charcot-Marie-Tooth neuropathy-2A
118425	Myotonia congenita, dominant, 160800
118425	Myotonia congenita, recessive, 255700
118425	Myotonia levior, recessive
118511	Schizophrenia, neurophysiologic defect in
120110	Metaphyseal chondrodysplasia, Schmid type
120120	Epidermolysis bullosa dystrophica, dominant, 131750
120120	Epidermolysis bullosa dystrophica, recessive, 226600
120120	Epidermolysis bullosa, pretibial, 131850
120150	Osteogenesis imperfecta, 4 clinical forms, 166200, 166210, 259420, 166220
120150	Osteoporosis, idiopathic, 166710
120150	Ehlers-Danlos syndrome, type VIIA1, 130060
120160	Osteogenesis imperfecta, 4 clinical forms, 166200, 166210, 259420, 166220
120160	Osteoporosis, idiopathic, 166710
120160	Ehlers-Danlos syndrome, type VIIA2, 130060
120160	Marfan syndrome, atypical
120220	Bethlem myopathy, 158810
120240	Bethlem myopathy, 158810
120290	OSMED syndrome, 215150
120290	Stickler syndrome, type II, 184840
120435	Muir-Torre syndrome, 158320
120435	Colorectal cancer, hereditary, nonpolyposis, type 1 Ovarian cancer
120436	Muir-Torre family cancer syndrome, 158320
120436	Turcot syndrome with glioblastoma, 276300
120436	Colorectal cancer, hereditary nonpolyposis, type 2
120550	C1q deficiency, type A
120570	C1q deficiency, type B
120575	C1q deficiency, type C
120700	C3 deficiency
120810	C4 deficiency
120820	C4 deficiency
120900	C5 deficiency
120950	C8 deficiency, type I
120960	C8 deficiency, type II

121011	Deafness, autosomal dominant 3, 601544
121011	Deafness, autosomal recessive 1, 220290
121014	Heterotaxia, visceroatrial, autosomal recessive
121050	Contractural arachnodactyly, congenital
121360	Myeloid leukemia, acute, M4Eo subtype
121800	Corneal dystrophy, crystalline, Schnyder
122500	[Transcortin deficiency]
122720	Nicotine addiction, protection from
122720	Coumarin resistance, 122700
123000	Craniometaphyseal dysplasia
123580	Cataract, congenital, autosomal dominant
123940	White sponge nevus, 193900
124030	Parkinsonism, susceptibility to
124030	Debrisoquine sensitivity
124080	CMO II deficiency
125490	Dentinogenesis imperfecta-1
126150	Diphtheria, susceptibility to
126340	Xeroderma pigmentosum, group D, 278730
126391	DNA ligase I deficiency
126600	Drusen, radial, autosomal dominant
126650	Chloride diarrhea, congenital, Finnish type, 214700
126650	Colon cancer
129010	Neuropathy, congenital hypomyelinating, 1
129500	Ectodermal dysplasia, hidrotic
129900	EEC syndrome-1
130410	Glutaricaciduria, type IIB
130500	Elliptocytosis-1
131100	Multiple endocrine neoplasia I
131100	Prolactinoma, hyperparathyroidism, carcinoid syndrome
131100	Carcinoid tumor of lung
131195	Hereditary hemorrhagic telangiectasia-1, 187300
131210	Atherosclerosis, susceptibility to
131400	Eosinophilia, familial
132700	Cylindromatosis
133171	[Erythrocytosis, familial], 133100
133200	Erythrokeratodermia variabilis
133780	Vitreoretinopathy, exudative, familial
134570	Factor XIIIA deficiency
134580	Factor XIIIB deficiency
134790	Hyperferritinemia-cataract syndrome, 600886
135300	Fibromatosis, gingival
135700	Fibrosis of extraocular muscles, congenital, 1
135940	Ichthyosis vulgaris, 146700
136132	[Fish-odor syndrome], 602079
136350	Pfeiffer syndrome, 101600
136435	Ovarian dysgenesis, hypergonadotropic, with normal karyotype,

	233300
136533	Rhabdomyosarcoma, alveolar, 268220
136550	Macular dystrophy, North Carolina type
136836	Fucosyltransferase-6 deficiency
138040	Cortisol resistance
138140	Glucose transport defect, blood-brain barrier
138320	Hemolytic anemia due to glutathione peroxidase deficiency
138570	Non-insulin dependent diabetes mellitus, susceptibility to
138700	[Apolipoprotein H deficiency]
138971	Kostmann neutropenia, 202700
138981	Pulmonary alveolar proteinosis, 265120
139250	Isolated growth hormone deficiency, Illig type with absent GH and Kowarski type with bioinactive GH
139350	Epidermolytic hyperkeratosis, 113800
139350	Keratoderma, palmoplantar, nonepidermolytic
142335	Hereditary persistence of fetal hemoglobin, heterocellular, Indian type
142470	[Hereditary persistence of fetal hemoglobin, heterocellular]
142857	Pemphigoid, susceptibility to
142858	Beryllium disease, chronic, susceptibility to
143890	Hypercholesterolemia, familial
145001	Hyperparathyroidism-jaw tumor syndrome
145260	Pseudohypoaldosteronism, type II
145981	Hypocalciuric hypercalcemia, type II
146150	Hypomelanosis of Ito
146150	Hypomelanosis of Ito
146760	[IgG receptor I, phagocytic, familial deficiency of]
146790	Lupus nephritis, susceptibility to
147050	Atopy
147061	Allergy and asthma susceptibility
147141	Leukemia, acute lymphoblastic
147200	[Kappa light chain deficiency]
147575	Myelodysplastic syndrome, preleukemic
147575	Myelogenous leukemia, acute
147575	Macrocytic anemia refractory, of 5q- syndrome, 153550
147670	Rabson-Mendenhall syndrome
147670	Diabetes mellitus, insulin-resistant, with acanthosis nigricans
147670	Leprechaunism
147781	Atopy, susceptibility to
148040	Epidermolysis bullosa simplex, Koebner, Dowling-Meara, and Weber-Cockayne types, 131900, 131760, 131800
148041	Pachyonychia congenita, Jadassohn-Lewandowsky type, 167200
148043	Meesmann corneal dystrophy, 122100
148065	White sponge nevus, 193900
148070	Liver disease, susceptibility to, from hepatotoxins or viruses
148080	Epidermolytic hyperkeratosis, 113800
148370	Keratolytic winter erythema

148500	Tylosis with esophageal cancer
150200	[Placental lactogen deficiency]
150210	Lactoferrin-deficient neutrophils, 245480
150270	Laryngeal adductor paralysis
150292	Epidermolysis bullosa, Herlitz junctional type, 226700
151385	Leukemia, acute myeloid
151440	Leukemia, T-cell acute lymphoblastoid
151670	Hepatic lipase deficiency
152427	Long QT syndrome-2
152445	Vohwinkel syndrome, 124500
152445	Erythrokeratoderma, progressive symmetric, 602036
152760	Hypogonadotropic hypogonadism due to GNRH deficiency, 227200
152790	Precocious puberty, male, 176410
152790	Leydig cell hypoplasia
153454	Ehlers-Danlos syndrome, type VI, 225400
153455	Cutis laxa, recessive, type I, 219100
153700	Macular dystrophy, vitelliform type
153900	Stargardt disease-2
154275	Malignant hyperthermia susceptibility 2
154276	Malignant hyperthermia susceptibility 3
154545	Chronic infections, due to opsonin defect
154705	Marfan syndrome, type II
156225	Muscular dystrophy, congenital merosin-deficient
156600	Microcoria, congenital
157170	Holoprosencephaly-2
157640	PEO with mitochondrial DNA deletions, type 1
159000	Muscular dystrophy, limb-girdle, type 1A
159001	Muscular dystrophy, limb-girdle, type 1B
159440	Charcot-Marie-Tooth neuropathy-1B, 118200
159440	Dejerine-Sottas disease, myelin P-related, 145900
159440	Hypomyelination, congenital
160900	Myotonic dystrophy
161015	Mitochondrial complex I deficiency, 252010
162100	Neuralgic amyotrophy with predilection for brachial plexus
162400	Neuropathy, hereditary sensory and autonomic, type 1
163729	Hypertension, pregnancy-induced
164009	Leukemia, acute promyelocytic, NUMA/RARA type
164200	Oculodentodigital dysplasia
164200	Syndactyly, type III, 186100
164731	Ovarian carcinoma, 167000
164761	Multiple endocrine neoplasia IIA, 171400
164761	Multiple endocrine neoplasia IIB, 162300
164761	Hirschsprung disease, 142623
164761	Medullary thyroid carcinoma, 155240
164860	Renal cell carcinoma, papillary, familial and sporadic
164953	Liposarcoma

166800	Otosclerosis
167250	Paget disease of bone
167410	Rhabdomyosarcoma, alveolar, 268220
168360	Paraneoplastic sensory neuropathy
168461	Multiple myeloma, 254250
168461	Parathyroid adenomatosis 1
168461	Centrocytic lymphoma
168468	Metaphyseal chondrodysplasia, Murk Jansen type, 156400
168470	Humoral hypercalcemia of malignancy
169600	Hailey-Hailey disease
170261	Bare lymphocyte syndrome, type I, due to TAP2 deficiency
170500	Myotonia congenita, atypical acetazolamide-responsive
170500	Paramyotonia congenita, 168300
170500	Hyperkalemic periodic paralysis
170650	Periodontitis, juvenile
171190	Hypertension, essential, 145500
171760	Hypophosphatasia, adult, 146300
171760	Hypophosphatasia, infantile, 241500
171860	Hemolytic anemia due to phosphofructokinase deficiency
172400	Hemolytic anemia due to glucosephosphate isomerase deficiency
172400	Hydrops fetalis, one form
172411	Colorectal cancer, resistance to
172471	Glycogenosis, hepatic, autosomal
172490	Phosphorylase kinase deficiency of liver and muscle, 261750
173360	Thrombophilia due to excessive plasminogen activator inhibitor
173360	Hemorrhagic diathesis due to PAI1 deficiency
173610	Platelet alpha/delta storage pool deficiency
173850	Polio, susceptibility to
174000	Medullary cystic kidney disease, AD
174900	Polyposis, juvenile intestinal
176100	Porphyria cutanea tarda
176100	Porphyria, hepatoerythropoietic
176450	Sacral agenesis-1
176960	Pituitary tumor, invasive
177900	Psoriasis susceptibility-1
178300	Ptosis, hereditary congenital, 1
178640	Pulmonary alveolar proteinosis, congenital, 265120
179095	Male infertility
179450	Ragweed sensitivity
179605	Retinitis pigmentosa, digenic
179605	Retinitis pigmentosa-7, peripherin-related
179605	Retinitis punctata albescens
179605	Butterfly dystrophy, retinal
179605	Macular dystrophy
179755	Renal cell carcinoma, papillary, 1
180069	Retinal dystrophy, autosomal recessive, childhood-onset

180069	Retinitis pigmentosa-20
180069	Leber congenital amaurosis-2, 204100
180090	Retinitis pigmentosa, autosomal recessive
180100	Retinitis pigmentosa-1
180105	Retinitis pigmentosa-10
180200	Osteosarcoma, 259500
180200	Pinealoma with bilateral retinoblastoma
180200	Retinoblastoma
180200	Bladder cancer, 109800
180250	Retinol binding protein, deficiency of
180297	Anemia, hemolytic, Rh-null, suppressor type, 268150
180380	Night blindness, congenital stationery, rhodopsin-related
180380	Retinitis pigmentosa, autosomal recessive
180380	Retinitis pigmentosa-4, autosomal dominant
180381	Oguchi disease-2, 258100
180721	Retinitis pigmentosa, digenic
180840	Susceptibility to IDDM
180901	Malignant hyperthermia susceptibility 1, 145600
180901	Central core disease, 117000
181460	Schistosoma mansoni, susceptibility/resistance to
182280	Small-cell cancer of lung
182290	Smith-Magenis syndrome
182380	Glucose/galactose malabsorption
182381	Renal glucosuria, 253100
182452	Lung cancer, small cell
182600	Spastic paraplegia-3A
182601	Spastic paraplegia-4
182860	Pyropoikilocytosis
182860	Spherocytosis, recessive
182860	Elliptocytosis-2
182900	Spherocytosis-2
183600	Split hand/foot malformation, type 1
185000	Stomatocytosis I
185470	Myopathy due to succinate dehydrogenase deficiency
185800	Symphalangism, proximal
186580	Arthrocutaneouveal granulomatosis
186770	Leukemia, T-cell acute lymphocytic
186780	CD3, zeta chain, deficiency
186880	Leukemia/lymphoma, T-cell
186940	[CD4(+) lymphocyte deficiency]
186940	Lupus erythematosus, susceptibility to
186960	Leukemia/lymphoma, T-cell
187040	Leukemia-1, T-cell acute lymphoblastic
188070	Bleeding disorder due to defective thromboxane A2 receptor
188540	Hypothyroidism, nongoitrous
188550	Thyroid papillary carcinoma

188826	Sorsby fundus dystrophy, 136900
189980	Leukemia, chronic myeloid
190000	Atransferrinemia
190040	Dermatofibrosarcoma protuberans
190040	Giant-cell fibroblastoma
190040	Meningioma, SIS-related
190195	Ichthyosiform erythroderma, congenital, 242100
190195	Ichthyosis, lamellar, autosomal recessive, 242300
190605	Triphalangeal thumb-polysyndactyly syndrome
190685	Down syndrome
191030	Nemaline myopathy-1, 161800
191170	Colorectal cancer, 114500
191170	Li-Fraumeni syndrome
191181	Cervical carcinoma
191315	Insensitivity to pain, congenital, with anhidrosis, 256800
192340	Diabetes insipidus, neurohypophyseal, 125700
192974	Neonatal alloimmune thrombocytopenia
192974	Glycoprotein Ia deficiency
193235	Vitreoretinopathy, neovascular inflammatory
200990	Acrocallosal syndrome
201450	Acyl-CoA dehydrogenase, medium chain, deficiency of
201475	VLCAD deficiency
201910	Adrenal hyperplasia, congenital, due to 21-hydroxylase deficiency
202010	Adrenal hyperplasia, congenital, due to 11-beta-hydroxylase deficiency
202010	Aldosteronism, glucocorticoid-remediable
203310	Ocular albinism, autosomal recessive
203500	Alkaptonuria
203800	Alstrom syndrome
205900	Anemia, Diamond-Blackfan
207750	Hyperlipoproteinemia, type Ib
208250	Jacobs syndrome
209901	Bardet-Biedl syndrome 1
210900	Bloom syndrome
214400	Charcot-Marie-Tooth neuropathy-4A
216900	Achromatopsia
217000	C2 deficiency
217800	Macular corneal dystrophy
218000	Andermann syndrome
218030	Apparent mineralocorticoid excess, hypertension due to
221770	Polycystic lipomembranous osteodysplasia with sclerosing leukencephalopathy
221820	Gliosis, familial progressive subcortical
222100	Diabetes mellitus, insulin-dependent-1
222700	Lysinuric protein intolerance
222800	Hemolytic anemia due to bisphosphoglycerate mutase deficiency
222900	Sucrose intolerance

223900	Dysautonomia, familial
224120	Dyserythropoietic anemia, contenital, type I
226450	Epidermolysis bullosa inversa, junctional
227220	[Eye color, brown]
227500	Factor VII deficiency
227600	Factor X deficiency
227645	Fanconi anemia, type C
227646	Fanconi anemia, type D
229700	Fructose-bisphosphatase deficiency
230000	Fucosidosis
230200	Galactokinase deficiency with cataracts
230350	Galactose epimerase deficiency
230450	Hemolytic anemia due to gamma-glutamylcysteine synthetase deficiency
230800	Gaucher disease
230800	Gaucher disease with cardiovascular calcification
231550	Achalasia-addisonianism-alacrimia syndrome
231670	Glutaricaciduria, type I
232000	Propionicacidemia, type I or pccA type
232050	Propionicacidemia, type II or pccB type
232600	McArdle disease
233100	[Renal glucosuria]
234200	Neurodegeneration with brain iron accumulation
235200	Hemochromatosis
236100	Holoprosencephaly-1
236200	Homocystinuria, B6-responsive and nonresponsive types
236250	Homocystinuria due to MTHFR deficiency
236730	Urofacial syndrome
238970	HHH syndrome
240300	Autoimmune polyglandular disease, type I
243500	Isovalericacidemia
245200	Krabbe disease
246900	Lipoamide dehydrogenase deficiency
248600	Maple syrup urine disease, type Ia
248610	Maple syrup urine disease, type II
248611	Maple syrup urine disease, type Ib
249000	Meckel syndrome
250100	Metachromatic leukodystrophy
250800	Methemoglobinemia, type I
250800	Methemoglobinemia, type II
253250	Mulibrey nanism
253700	Muscular dystrophy, limb-girdle, type 2C
253800	Walker-Warburg syndrome, 236670
253800	Fukuyama type congenital muscular dystrophy
254770	Epilepsy, juvenile myoclonic
255800	Schwartz-Jampel syndrome

256550	Sialidosis, type I
256550	Sialidosis, type II
256700	Neuroblastoma
256731	Ceroid-lipofuscinosis, neuronal-5, variant late infantile
256850	Giant axonal neuropathy-1
258501	3-methylglutaconicaciduria, type III
259700	Osteopetrosis, recessive
259770	Osteoporosis-pseudoglioma syndrome
263200	Polycystic kidney disease, autosomal recessive
264800	Pseudoxanthoma elasticum
266150	Pyruvate carboxylase deficiency
266200	Anemia, hemolytic, due to PK deficiency
266600	Inflammatory bowel disease-1
267750	Knobloch syndrome
268900	[Sarcosinemia]
269920	Salla disease
270200	Sjogren-Larsson syndrome
271245	Spinocerebellar ataxia-8, infantile, with sensory neuropathy
274600	Pendred syndrome
274600	Deafness, autosomal recessive 4
276000	Pancreatitis, hereditary, 167800
276000	Trypsinogen deficiency
276902	Usher syndrome, type 3
276903	Usher syndrome, type 1B
276903	Deafness, autosomal dominant 11, neurosensory, 601317
276903	Deafness, autosomal recessive 2, neurosensory, 600060
277700	Werner syndrome
277900	Wilson disease
278000	Wolman disease
278000	Cholesteryl ester storage disease
278300	Xanthinuria, type I
278700	Xeroderma pigmentosum, group A
278760	Xeroderma pigmentosum, group F
300018	Pseudohermaphroditism, male
300037	Simpson dysmorphia syndrome, 312870
300046	Mental retardation, X-linked 23, nonspecific
300047	Mental retardation, X-linked 20
300062	Mental retardation, X-linked 14
300067	Subcortical laminar heterotopia, X-linked dominant
300067	Lissencephaly, X-linked
300071	Night blindness, congenital stationary, type 2
300075	Coffin-Lowry syndrome, 303600
300076	Wood neuroimmunologic syndrome
300077	Mental retardation, X-linked 29
300110	Night blindness, congenital stationary, X-linked incomplete, 300071
300121	Subcortical laminal heteropia, X-linked, 300067

300121	Lissencephaly, X-linked, 300067
300123	Mental retardation with isolated growth hormone deficiency
300200	Adrenal hypoplasia, congenital, with hypogonadotropic hypogonadism
300600	Ocular albinism, Forsius-Eriksson type
301000	Thrombocytopenia, X-linked, 313900
301000	Wiskott-Aldrich syndrome
301200	Amelogenesis imperfecta
301201	Amelogenesis imperfecta-3, hypoplastic type
301220	Partington syndrome II
301830	Arthrogryposis, X-linked (spinal muscular atrophy, infantile, X-linked)
301835	Arts syndrome
301845	Bazex syndrome
301900	Borjeson-Forssman-Lehmann syndrome
302350	Nance-Horan syndrome
303100	Choroideremia
304020	Cone dystrophy, progressive X-linked, 1
304340	Mental retardation, X-linked, syndromic-5, with Dandy-Walker malformation, basal ganglia disease, and seizures
305450	FG syndrome
306000	Glycogenosis, X-linked hepatic, type I
306000	Glycogenosis, X-linked hepatic, type II
306100	Gonadal dysgenesis, XY female type
307030	Glycerol kinase deficiency
307150	Hypertrichosis, congenital generalized
307700	Hypoparathyroidism, X-linked
307800	Hypophosphatemia, hereditary
308000	HPRT-related gout
308000	Lesch-Nyhan syndrome
308230	Immunodeficiency, X-linked, with hyper-IgM
308240	Lymphoproliferative syndrome, X-linked
309470	Mental retardation, X-linked, syndromic-3, with spastic diplegia
309500	Renpenning syndrome-1
309510	Mental retardation, X-linked, syndromic-1, with dystonic movements, ataxia, and seizures
309555	Gustavson syndrome
309585	Mental retardation, X-linked, syndromic-6, with gynecomastia and obesity
309605	Mental retardation, X-linked, syndromic-4, with congenital contractures and low fingertip arches
309610	Mental retardation, X-linked, syndromic-2, with dysmorphism and cerebral atrophy
309850	Brunner syndrome
310490	Cowchock syndrome
310500	Night blindness, congenital stationary, type 1
310600	Norrie disease

310600	Exudative vitreoretinopathy, X-linked, 305390
311050	Optic atrophy, X-linked
311770	Paroxysmal nocturnal hemoglobinuria
311850	Phosphoribosyl pyrophosphate synthetase-related gout
312000	Panhypopituitarism, X-linked
312040	N syndrome, 310465
312060	Properdin deficiency, X-linked
312170	Pyruvate dehydrogenase deficiency
312600	Retinitis pigmentosa-2
312612	Retinitis pigmentosa-6
312700	Retinoschisis
313350	Split hand/foot malformation, type 2
313400	Spondyloepiphyseal dysplasia tarda
313850	Thoracoabdominal syndrome
314580	Wieacker-Wolff syndrome
600040	Colorectal cancer
600045	Xeroderma pigmentosum, group E, subtype 2
600065	Leukocyte adhesion deficiency, 116920
600095	Split hand/foot malformation, type 3
600101	Deafness, autosomal dominant 2
600105	Retinitis pigmentosa-12, autosomal recessive
600163	Long QT syndrome-3
600184	Carnitine acetyltransferase deficiency
600194	Ichthyosis bullosa of Siemens, 146800
600202	Dyslexia, specific, 2
600231	Palmoplantar keratoderma, Bothnia type
600234	HMG-CoA synthease-2 deficiency
600243	Temperature-sensitive apoptosis
600261	Ehlers-Danlos-like syndrome
600276	Cerebral arteriopathy with subcortical infarcts and leukoencephalopathy, 125310
600309	Atrioventricular canal defect-1
600318	Diabetes mellitus, insulin-dependent, 3
600319	Diabetes mellitus, insulin-dependent, 4
600359	Bartter syndrome, type 2
600364	Cone dystrophy-3, 602093
600374	Bardet-Biedl syndrome 4
600510	Pigment dispersion syndrome
600512	Epilepsy, partial
600525	Trichodontoosseous syndrome, 190320
600528	CPT deficiency, hepatic, type I, 255120
600536	Myopathy, congenital
600617	Lipoid adrenal hyperplasia, 201710
600631	Enuresis, nocturnal, 1
600650	Myopathy due to CPT II deficiency, 255110
600650	CPT deficiency, hepatic, type II, 600649

600652	Deafness, autosomal dominant 4
600722	Ceroid lipofuscinosis, neuronal, variant juvenile type, with granular osmiophilic deposits
600722	Ceroid lipofuscinosis, neuronal-1, infantile, 256730
600725	Holoprosencephaly-3, 142945
600757	Orofacial cleft-3
600759	Alzheimer disease-4
600760	Pseudohypoaldosteronism, type I, 264350
600760	Liddle syndrome, 177200
600761	Pseudohypoaldosteronism, type I, 264350
600761	Liddle syndrome, 177200
600807	Bronchial asthma
600808	Enuresis, nocturnal, 2
600839	Bartter syndrome, 241200
600852	Retinitis pigmentosa-17
600882	Charcot-Marie-Tooth neuropathy-2B
600897	Cataract, zonular pulverulent-1, 116200
600918	Cystinuria, type III
600923	Porphyria variegata, 176200
600956	Persistent Mullerian duct syndrome, type II, 261550
600957	Persistent Mullerian duct syndrome, type I, 261550
600968	Gitelman syndrome, 263800
600975	Glaucoma 3, primary infantile, B
600995	Nephrotic syndrome, idiopathic, steroid-resistant
601071	Deafness, autosomal recessive 9
601072	Deafness, autosomal recessive 8
601090	Iridogoniodysgenesis, 601631
601097	Neuropathy, recurrent, with pressure palsies, 162500
601097	Charcot-Marie-Tooth neuropathy-1A, 118220
601097	Dejerine-Sottas disease, PMP22 related, 145900
601105	Pycnodysostosis, 265800
601107	Dubin-Johnson syndrome, 237500
601130	Tolbutamide poor metabolizer
601145	Epilepsy, progressive myoclonic 1, 254800
601154	Cardiomyopathy, dilated, 1E
601199	Neonatal hyperparathyroidism, 239200
601199	Hypocalcemia, autosomal dominant, 601198
601199	Hypocalciuric hypercalcemia, type I, 145980
601208	Insulin-dependent diabetes mellitus-11
601238	Cerebellar ataxia, Cayman type
601284	Hereditary hemorrhagic telangiectasia-2, 600376
601309	Basal cell carcinoma, sporadic
601309	Basal cell nevus syndrome, 109400
601316	Deafness, autosomal dominant 10
601386	Deafness, autosomal recessive 12
601410	Diabetes mellitus, transient neonatal

601412	Deafness, autosomal dominant 7
601414	Retinitis pigmentosa-18
601471	Moebius syndrome-2
601493	Cardiomyopathy, dilated 1C
601498	Peroxisomal biogenesis disorder, complementation group 4
601518	Prostate cancer, hereditary, 1, 176807
601596	Charcot-Marie-Tooth neuropathy, demyelinating
601623	Angelman syndrome
601652	Glaucoma 1A, primary open angle, juvenile-onset, 137750
601666	Insulin-dependent diabetes mellitus-15
601676	Acute insulin response
601682	Glaucoma 1C, primary open angle
601690	Platelet-activating factor acetylhydrolase deficiency
601691	Retinitis pigmentosa-19, 601718
601691	Stargardt disease-1, 248200
601691	Cone-rod dystrophy 3
601691	Fundus flavimaculatus with macular dystrophy, 248200
601692	Reis-Bucklers corneal dystrophy
601692	Corneal dystrophy, Avellino type
601692	Corneal dystrophy, Groenouw type I, 121900
601692	Corneal dystrophy, lattice type I, 122200
601718	Retinitis pigmentosa-19
601757	Rhizomelic chondrodysplasia punctata, type 1, 215100
601769	Osteoporosis, involutional
601769	Rickets, vitamin D-resistant, 277440
601771	Glaucoma 3A, primary infantile, 231300
601780	Ceroid-lipofuscinosis, neuronal-6, variant late infantile
601800	[Hair color, brown]
601841	Protein C inhibitor deficiency
601843	Hypothyroidism, congenital, 274400
601844	Pseudohypoaldosteronism type II
601846	Muscular dystrophy with rimmed vacuoles
601863	Bare lymphocyte syndrome, complementation group C
601868	Deafness, autosomal dominant 13
601884	[High bone mass]
601885	Cataract, zonular pulverulent-2
601889	Lymphoma, diffuse large cell
601928	Monilethrix, 158000
602014	Hypomagnesemia with secondary hypocalcemia
602028	Multiple myeloma
602066	Convulsions, infantile and paroxysmal choreoathetosis
602081	Speech-language disorder-1
602082	Corneal dystrophy, Thiel-Behnke type
602085	Postaxial polydactyly, type A2
602088	Nephronophthisis, infantile
602089	Hemangioma, capillary, hereditary

602094	Lipodystrophy, familial partial
602096	Alzheimer disease-5
602099	Amytrophic lateral sclerosis-5
602116	Glioma
602117	Prader-Willi syndrome
602121	Deafness, autosomal dominant nonsyndromic sensorineural, 1, 124900
602134	Tremor, familial essential, 2
602136	Refsum disease, infantile, 266510
602136	Zellweger syndrome-1, 214100
602136	Adrenoleukodystrophy, neonatal, 202370
602153	Monilethrix, 158000
602216	Peutz-Jeghers syndrome, 175200
602221	Stem-cell leukemia/lymphoma syndrome
602225	Cone-rod retinal dystrophy-2, 120970
602225	Leber congenital amaurosis, type III
602279	Oculopharyngeal muscular dystorphy, 164300
602279	Oculopharyngeal muscular dystrophy, autosomal recessive, 257950
602280	Retinitis pigmentosa-14, 600132
602404	Parkinson disease, type 3
602447	Coronary artery disease, susceptibility to
602460	Deafness, autosomal dominant 15, 602459
602475	Ossification of posterior longitudinal ligament of spine
602476	Febrile convulsions, familial, 1
602477	Febrile convulsions, familial, 2
602491	Hyperlipidemia, familial combined, 1
602522	Bartter syndrome, infantile, with sensorineural deafness
602568	Homocystinuria-megaloblastic anemia, cbl E type, 236270
602574	Deafness, autosomal dominant 12, 601842
602574	Deafness, autosomal dominant 8, 601543
602575	Nail-patella syndrome with open-angle glaucoma, 137750
602575	Nail-patella syndrome, 161200
602666	Deafness, autosomal recessive 3, 600316
602667	Nijmegen breakage syndrome, 251260
602716	Nephrosis-1, congenital, Finnish type, 256300
602771	Muscular dystrophy, congenital, with early spine rigidity
602772	Retinitis pitmentosa-24

Polynucleotide and Polypeptide Variants

[0087] The present invention is directed to variants of the polynucleotide sequence disclosed in SEQ ID NO:X or the complementary strand thereto, nucleotide sequences encoding the polypeptide of SEQ ID NO:Y, the nucleotide sequence of SEQ ID NO:X encoding the polypeptide sequence as defined in column 7 of Table 1, nucleotide sequences encoding the polypeptide as defined in column 7 of Table 1, the nucleotide sequence as defined in columns 8 and 9 of Table 2, nucleotide sequences encoding the polypeptide encoded by the nucleotide sequence as defined in columns 8 and 9 of Table 2, the cDNA sequence contained in Clone ID NO:Z, and/or nucleotide sequences encoding the polypeptide encoded by the cDNA sequence contained in Clone ID NO:Z.

[0088] The present invention also encompasses variants of the polypeptide sequence disclosed in SEQ ID NO:Y, the polypeptide sequence as defined in column 7 of Table 1, a polypeptide sequence encoded by the polynucleotide sequence in SEQ ID NO:X, a polypeptide sequence encoded by the nucleotide sequence as defined in columns 8 and 9 of Table 2, a polypeptide sequence encoded by the complement of the polynucleotide sequence in SEQ ID NO:X, and/or a polypeptide sequence encoded by the cDNA sequence contained in Clone ID NO:Z.

[0089] "Variant" refers to a polynucleotide or polypeptide differing from the polynucleotide or polypeptide of the present invention, but retaining essential properties thereof. Generally, variants are overall closely similar, and, in many regions, identical to the polynucleotide or polypeptide of the present invention.

[0090] Thus, one aspect of the invention provides an isolated nucleic acid molecule comprising, or alternatively consisting of, a polynucleotide having a nucleotide sequence selected from the group consisting of: (a) a nucleotide sequence described in SEQ ID NO:X or contained in the cDNA sequence of Clone ID NO:Z; (b) a nucleotide sequence in SEQ ID NO:X or the cDNA in Clone ID NO:Z which encodes the complete amino acid sequence of SEQ ID NO:Y or the complete amino acid sequence encoded by the cDNA in Clone ID NO:Z; (c) a nucleotide sequence in SEQ ID NO:X or the cDNA in Clone ID NO:Z which encodes a mature polypeptide; (d) a nucleotide sequence in SEQ ID NO:X or the cDNA sequence of Clone ID NO:Z, which encodes a biologically active fragment of a polypeptide; (e) a nucleotide sequence in SEQ ID NO:X or the cDNA sequence of Clone ID NO:Z, which

encodes an antigenic fragment of a polypeptide; (f) a nucleotide sequence encoding a polypeptide comprising the complete amino acid sequence of SEQ ID NO:Y or the complete amino acid sequence encoded by the cDNA in Clone ID NO:Z; (g) a nucleotide sequence encoding a mature polypeptide of the amino acid sequence of SEQ ID NO:Y or the amino acid sequence encoded by the cDNA in Clone ID NO:Z; (h) a nucleotide sequence encoding a biologically active fragment of a polypeptide having the complete amino acid sequence of SEQ ID NO:Y or the complete amino acid sequence encoded by the cDNA in Clone ID NO:Z; (i) a nucleotide sequence encoding an antigenic fragment of a polypeptide having the complete amino acid sequence of SEQ ID NO:Y or the complete amino acid sequence encoded by the cDNA in Clone ID NO:Z; and (j) a nucleotide sequence complementary to any of the nucleotide sequences in (a), (b), (c), (d), (e), (f), (g), (h), or (i) above.

[0091] The present invention is also directed to nucleic acid molecules which comprise, or alternatively consist of, a nucleotide sequence which is at least 80%, 85%, 90%, 95%, 96%, 97%, 98%, 99% or 100%, identical to, for example, any of the nucleotide sequences in (a), (b), (c), (d), (e), (f), (g), (h), (i), or (j) above, the nucleotide coding sequence in SEQ ID NO:X or the complementary strand thereto, the nucleotide coding sequence of the cDNA contained in Clone ID NO:Z or the complementary strand thereto, a nucleotide sequence encoding the polypeptide of SEQ ID NO:Y, a nucleotide sequence encoding a polypeptide sequence encoded by the nucleotide sequence in SEQ ID NO:X, a polypeptide sequence encoded by the complement of the polynucleotide sequence in SEQ ID NO:X, a nucleotide sequence encoding the polypeptide encoded by the cDNA contained in Clone ID NO:Z, the nucleotide coding sequence in SEQ ID NO:X as defined in columns 8 and 9 of Table 2 or the complementary strand thereto, a nucleotide sequence encoding the polypeptide encoded by the nucleotide sequence in SEQ ID NO:X as defined in columns 8 and 9 of Table 2 or the complementary strand thereto, the nucleotide sequence in SEQ ID NO:X encoding the polypeptide sequence as defined in column 7 of Table 1 or the complementary strand thereto, nucleotide sequences encoding the polypeptide as defined in column 7 of Table 1 or the complementary strand thereto, and/or polynucleotide fragments of any of these nucleic acid molecules (e.g., those fragments described herein). Polynucleotides which hybridize to the complement of these nucleic acid molecules under stringent hybridization conditions or alternatively, under lower stringency conditions, are also encompassed by the invention, as are polypeptides encoded by these polynucleotides and nucleic acids.

[0092] In a preferred embodiment, the invention encompasses nucleic acid molecules which comprise, or alternatively, consist of a polynucleotide which hybridizes under stringent hybridization conditions, or alternatively, under lower stringency conditions, to a polynucleotide in (a), (b), (c), (d), (e), (f), (g), (h), or (i), above, as are polypeptides encoded by these polynucleotides. In another preferred embodiment, polynucleotides which hybridize to the complement of these nucleic acid molecules under stringent hybridization conditions, or alternatively, under lower stringency conditions, are also encompassed by the invention, as are polypeptides encoded by these polynucleotides.

[0093] In another embodiment, the invention provides a purified protein comprising, or alternatively consisting of, a polypeptide having an amino acid sequence selected from the group consisting of: (a) the complete amino acid sequence of SEQ ID NO:Y or the complete amino acid sequence encoded by the cDNA in Clone ID NO:Z; (b) the amino acid sequence of a mature form of a polypeptide having the amino acid sequence of SEQ ID NO:Y or the amino acid sequence encoded by the cDNA in Clone ID NO:Z; (c) the amino acid sequence of a biologically active fragment of a polypeptide having the complete amino acid sequence of SEQ ID NO:Y or the complete amino acid sequence encoded by the cDNA in Clone ID NO:Z; and (d) the amino acid sequence of an antigenic fragment of a polypeptide having the complete amino acid sequence of SEQ ID NO:Y or the complete amino acid sequence encoded by the cDNA in Clone ID NO:Z.

[0094] The present invention is also directed to proteins which comprise, or alternatively consist of, an amino acid sequence which is at least 80%, 85%, 90%, 95%, 96%, 97%, 98%, 99% or 100%, identical to, for example, any of the amino acid sequences in (a), (b), (c), or (d), above, the amino acid sequence shown in SEQ ID NO:Y, the amino acid sequence encoded by the cDNA contained in Clone ID NO:Z, the amino acid sequence of the polypeptide encoded by the nucleotide sequence in SEQ ID NO:X as defined in columns 8 and 9 of Table 2, the amino acid sequence as defined in column 7 of Table 1, an amino acid sequence encoded by the nucleotide sequence in SEQ ID NO:X, and an amino acid sequence encoded by the complement of the polynucleotide sequence in SEQ ID NO:X. Fragments of these polypeptides are also provided (e.g., those fragments described herein). Further proteins encoded by polynucleotides which hybridize to the complement of the nucleic acid molecules encoding these amino acid sequences under stringent hybridization conditions or

alternatively, under lower stringency conditions, are also encompassed by the invention, as are the polynucleotides encoding these proteins.

[0095] By a nucleic acid having a nucleotide sequence at least, for example, 95% "identical" to a reference nucleotide sequence of the present invention, it is intended that the nucleotide sequence of the nucleic acid is identical to the reference sequence except that the nucleotide sequence may include up to five point mutations per each 100 nucleotides of the reference nucleotide sequence encoding the polypeptide. In other words, to obtain a nucleic acid having a nucleotide sequence at least 95% identical to a reference nucleotide sequence, up to 5% of the nucleotides in the reference sequence may be deleted or substituted with another nucleotide, or a number of nucleotides up to 5% of the total nucleotides in the reference sequence may be inserted into the reference sequence. The query sequence may be an entire sequence referred to in Table 1 or 2 as the ORF (open reading frame), or any fragment specified as described herein.

[0096] As a practical matter, whether any particular nucleic acid molecule or polypeptide is at least 80%, 85%, 90%, 95%, 96%, 97%, 98% or 99% identical to a nucleotide sequence of the present invention can be determined conventionally using known computer programs. A preferred method for determining the best overall match between a query sequence (a sequence of the present invention) and a subject sequence, also referred to as a global sequence alignment, can be determined using the FASTDB computer program based on the algorithm of Brutlag et al. (Comp. App. Biosci. 6:237-245 (1990)). In a sequence alignment the query and subject sequences are both DNA sequences. An RNA sequence can be compared by converting U's to T's. The result of said global sequence alignment is expressed as percent identity. Preferred parameters used in a FASTDB alignment of DNA sequences to calculate percent identity are: Matrix=Unitary, k-tuple=4, Mismatch Penalty=1, Joining Penalty=30, Randomization Group Length=0, Cutoff Score=1, Gap Penalty=5, Gap Size Penalty 0.05, Window Size=500 or the length of the subject nucleotide sequence, whichever is shorter.

[0097] If the subject sequence is shorter than the query sequence because of 5' or 3' deletions, not because of internal deletions, a manual correction must be made to the results. This is because the FASTDB program does not account for 5' and 3' truncations of the subject sequence when calculating percent identity. For subject sequences truncated at the 5' or 3' ends, relative to the query sequence, the percent identity is corrected by calculating the

number of bases of the query sequence that are 5' and 3' of the subject sequence, which are not matched/aligned, as a percent of the total bases of the query sequence. Whether a nucleotide is matched/aligned is determined by results of the FASTDB sequence alignment. This percentage is then subtracted from the percent identity, calculated by the above FASTDB program using the specified parameters, to arrive at a final percent identity score. This corrected score is what is used for the purposes of the present invention. Only bases outside the 5' and 3' bases of the subject sequence, as displayed by the FASTDB alignment, which are not matched/aligned with the query sequence, are calculated for the purposes of manually adjusting the percent identity score.

[0098] For example, a 90 base subject sequence is aligned to a 100 base query sequence to determine percent identity. The deletions occur at the 5' end of the subject sequence and therefore, the FASTDB alignment does not show a matched/alignment of the first 10 bases at 5' end. The 10 unpaired bases represent 10% of the sequence (number of bases at the 5' and 3' ends not matched/total number of bases in the query sequence) so 10% is subtracted from the percent identity score calculated by the FASTDB program. If the remaining 90 bases were perfectly matched the final percent identity would be 90%. In another example, a 90 base subject sequence is compared with a 100 base query sequence. This time the deletions are internal deletions so that there are no bases on the 5' or 3' of the subject sequence which are not matched/aligned with the query. In this case the percent identity calculated by FASTDB is not manually corrected. Once again, only bases 5' and 3' of the subject sequence which are not matched/aligned with the query sequence are manually corrected for. No other manual corrections are to be made for the purposes of the present invention.

[0099] By a polypeptide having an amino acid sequence at least, for example, 95% "identical" to a query amino acid sequence of the present invention, it is intended that the amino acid sequence of the subject polypeptide is identical to the query sequence except that the subject polypeptide sequence may include up to five amino acid alterations per each 100 amino acids of the query amino acid sequence. In other words, to obtain a polypeptide having an amino acid sequence at least 95% identical to a query amino acid sequence, up to 5% of the amino acid residues in the subject sequence may be inserted, deleted, (indels) or substituted with another amino acid. These alterations of the reference sequence may occur at the amino or carboxy terminal positions of the reference amino acid sequence or anywhere between those terminal positions, interspersed either individually among residues in the

reference sequence or in one or more contiguous groups within the reference sequence.

[0100] As a practical matter, whether any particular polypeptide is at least 80%, 85%, 90%, 95%, 96%, 97%, 98% or 99% identical to, for instance, the amino acid sequence of a polypeptide referred to in Table 1 (e.g., the amino acid sequence identified in column 6) or Table 2 (e.g., the amino acid sequence of the polypeptide encoded by the polynucleotide sequence defined in columns 8 and 9 of Table 2) or a fragment thereof, the amino acid sequence of the polypeptide encoded by the nucleotide sequence in SEQ ID NO:X or a fragment thereof, or the amino acid sequence of the polypeptide encoded by cDNA contained in Clone ID NO:Z, or a fragment thereof, can be determined conventionally using known computer programs. A preferred method for determining the best overall match between a query sequence (a sequence of the present invention) and a subject sequence, also referred to as a global sequence alignment, can be determined using the FASTDB computer program based on the algorithm of Brutlag et al. (Comp. App. Biosci.6:237-245 (1990)). In a sequence alignment the query and subject sequences are either both nucleotide sequences or both amino acid sequences. The result of said global sequence alignment is expressed as percent identity. Preferred parameters used in a FASTDB amino acid alignment are: Matrix=PAM 0, k-tuple=2, Mismatch Penalty=1, Joining Penalty=20, Randomization Group Length=0, Cutoff Score=1, Window Size=sequence length, Gap Penalty=5, Gap Size Penalty=0.05, Window Size=500 or the length of the subject amino acid sequence, whichever is shorter.

[0101] If the subject sequence is shorter than the query sequence due to N- or C-terminal deletions, not because of internal deletions, a manual correction must be made to the results. This is because the FASTDB program does not account for N- and C-terminal truncations of the subject sequence when calculating global percent identity. For subject sequences truncated at the N- and C-termini, relative to the query sequence, the percent identity is corrected by calculating the number of residues of the query sequence that are N- and C-terminal of the subject sequence, which are not matched/aligned with a corresponding subject residue, as a percent of the total bases of the query sequence. Whether a residue is matched/aligned is determined by results of the FASTDB sequence alignment. This percentage is then subtracted from the percent identity, calculated by the above FASTDB program using the specified parameters, to arrive at a final percent identity score. This final percent identity score is what is used for the purposes of the present invention. Only residues

to the N- and C-termini of the subject sequence, which are not matched/aligned with the query sequence, are considered for the purposes of manually adjusting the percent identity score. That is, only query residue positions outside the farthest N- and C- terminal residues of the subject sequence.

[0102] For example, a 90 amino acid residue subject sequence is aligned with a 100 residue query sequence to determine percent identity. The deletion occurs at the N-terminus of the subject sequence and therefore, the FASTDB alignment does not show a matching/alignment of the first 10 residues at the N-terminus. The 10 unpaired residues represent 10% of the sequence (number of residues at the N- and C- termini not matched/total number of residues in the query sequence) so 10% is subtracted from the percent identity score calculated by the FASTDB program. If the remaining 90 residues were perfectly matched the final percent identity would be 90%. In another example, a 90 residue subject sequence is compared with a 100 residue query sequence. This time the deletions are internal deletions so there are no residues at the N- or C-termini of the subject sequence which are not matched/aligned with the query. In this case the percent identity calculated by FASTDB is not manually corrected. Once again, only residue positions outside the N- and C-terminal ends of the subject sequence, as displayed in the FASTDB alignment, which are not matched/aligned with the query sequnce are manually corrected for. No other manual corrections are to made for the purposes of the present invention.

[0103] The polynucleotide variants of the invention may contain alterations in the coding regions, non-coding regions, or both. Especially preferred are polynucleotide variants containing alterations which produce silent substitutions, additions, or deletions, but do not alter the properties or activities of the encoded polypeptide. Nucleotide variants produced by silent substitutions due to the degeneracy of the genetic code are preferred. Moreover, polypeptide variants in which less than 50, less than 40, less than 30, less than 20, less than 10, or 5-50, 5-25, 5-10, 1-5, or 1-2 amino acids are substituted, deleted, or added in any combination are also preferred. Polynucleotide variants can be produced for a variety of reasons, e.g., to optimize codon expression for a particular host (change codons in the human mRNA to those preferred by a bacterial host such as E. coli).

[0104] Naturally occurring variants are called "allelic variants," and refer to one of several alternate forms of a gene occupying a given locus on a chromosome of an organism. (Genes II, Lewin, B., ed., John Wiley & Sons, New York (1985)). These allelic variants can vary at

either the polynucleotide and/or polypeptide level and are included in the present invention. Alternatively, non-naturally occurring variants may be produced by mutagenesis techniques or by direct synthesis.

[0105] Using known methods of protein engineering and recombinant DNA technology, variants may be generated to improve or alter the characteristics of the polypeptides of the present invention. For instance, one or more amino acids can be deleted from the N-terminus or C-terminus of the polypeptide of the present invention without substantial loss of biological function. As an example, Ron et al. (J. Biol. Chem. 268: 2984-2988 (1993)) reported variant KGF proteins having heparin binding activity even after deleting 3, 8, or 27 amino-terminal amino acid residues. Similarly, Interferon gamma exhibited up to ten times higher activity after deleting 8-10 amino acid residues from the carboxy terminus of this protein. (Dobeli et al., J. Biotechnology 7:199-216 (1988).)

[0106] Moreover, ample evidence demonstrates that variants often retain a biological activity similar to that of the naturally occurring protein. For example, Gayle and coworkers (J. Biol. Chem. 268:22105-22111 (1993)) conducted extensive mutational analysis of human cytokine IL-1a. They used random mutagenesis to generate over 3,500 individual IL-1a mutants that averaged 2.5 amino acid changes per variant over the entire length of the molecule. Multiple mutations were examined at every possible amino acid position. The investigators found that "[m]ost of the molecule could be altered with little effect on either [binding or biological activity]." In fact, only 23 unique amino acid sequences, out of more than 3,500 nucleotide sequences examined, produced a protein that significantly differed in activity from wild-type.

[0107] Furthermore, even if deleting one or more amino acids from the N-terminus or C-terminus of a polypeptide results in modification or loss of one or more biological functions, other biological activities may still be retained. For example, the ability of a deletion variant to induce and/or to bind antibodies which recognize the secreted form will likely be retained when less than the majority of the residues of the secreted form are removed from the N-terminus or C-terminus. Whether a particular polypeptide lacking N- or C-terminal residues of a protein retains such immunogenic activities can readily be determined by routine methods described herein and otherwise known in the art.

[0108] Thus, the invention further includes polypeptide variants which show a functional activity (e.g., biological activity) of the polypeptides of the invention. Such variants include

deletions, insertions, inversions, repeats, and substitutions selected according to general rules known in the art so as have little effect on activity.

[0109] The present application is directed to nucleic acid molecules at least 80%, 85%, 90%, 95%, 96%, 97%, 98%, 99% or 100% identical to the nucleic acid sequences disclosed herein, (e.g., encoding a polypeptide having the amino acid sequence of an N and/or C terminal deletion), irrespective of whether they encode a polypeptide having functional activity. This is because even where a particular nucleic acid molecule does not encode a polypeptide having functional activity, one of skill in the art would still know how to use the nucleic acid molecule, for instance, as a hybridization probe or a polymerase chain reaction (PCR) primer. Uses of the nucleic acid molecules of the present invention that do not encode a polypeptide having functional activity include, inter alia, (1) isolating a gene or allelic or splice variants thereof in a cDNA library; (2) in situ hybridization (e.g., "FISH") to metaphase chromosomal spreads to provide precise chromosomal location of the gene, as described in Verma et al., Human Chromosomes: A Manual of Basic Techniques, Pergamon Press, New York (1988); (3) Northern Blot analysis for detecting mRNA expression in specific tissues (e.g., normal or diseased tissues); and (4) *in situ* hybridization (e.g., histochemistry) for detecting mRNA expression in specific tissues (e.g., normal or diseased tissues).

[0110] Preferred, however, are nucleic acid molecules having sequences at least 80%, 85%, 90%, 95%, 96%, 97%, 98%, 99% or 100% identical to the nucleic acid sequences disclosed herein, which do, in fact, encode a polypeptide having functional activity. By a polypeptide having "functional activity" is meant, a polypeptide capable of displaying one or more known functional activities associated with a full-length (complete) protein of the invention. Such functional activities include, but are not limited to, biological activity, antigenicity [ability to bind (or compete with a polypeptide of the invention for binding) to an anti-polypeptide of the invention antibody], immunogenicity (ability to generate antibody which binds to a specific polypeptide of the invention), ability to form multimers with polypeptides of the invention, and ability to bind to a receptor or ligand for a polypeptide of the invention.

[0111] The functional activity of the polypeptides, and fragments, variants and derivatives of the invention, can be assayed by various methods.

[0112] For example, in one embodiment where one is assaying for the ability to bind or compete with a full-length polypeptide of the present invention for binding to an anti-polypetide antibody, various immunoassays known in the art can be used, including but not limited to, competitive and non-competitive assay systems using techniques such as radioimmunoassays, ELISA (enzyme linked immunosorbent assay), "sandwich" immunoassays, immunoradiometric assays, gel diffusion precipitation reactions, immunodiffusion assays, in situ immunoassays (using colloidal gold, enzyme or radioisotope labels, for example), western blots, precipitation reactions, agglutination assays (e.g., gel agglutination assays, hemagglutination assays), complement fixation assays, immunofluorescence assays, protein A assays, and immunoelectrophoresis assays, etc. In one embodiment, antibody binding is detected by detecting a label on the primary antibody. In another embodiment, the primary antibody is detected by detecting binding of a secondary antibody or reagent to the primary antibody. In a further embodiment, the secondary antibody is labeled. Many means are known in the art for detecting binding in an immunoassay and are within the scope of the present invention.

[0113] In another embodiment, where a ligand is identified, or the ability of a polypeptide fragment, variant or derivative of the invention to multimerize is being evaluated, binding can be assayed, e.g., by means well-known in the art, such as, for example, reducing and non-reducing gel chromatography, protein affinity chromatography, and affinity blotting. See generally, Phizicky et al., Microbiol. Rev. 59:94-123 (1995). In another embodiment, the ability of physiological correlates of a polypeptide of the present invention to bind to a substrate(s) of the polypeptide of the invention can be routinely assayed using techniques known in the art.

[0114] In addition, assays described herein (see Examples) and otherwise known in the art may routinely be applied to measure the ability of polypeptides of the present invention and fragments, variants and derivatives thereof to elicit polypeptide related biological activity (either *in vitro* or *in vivo*). Other methods will be known to the skilled artisan and are within the scope of the invention.

[0115] Of course, due to the degeneracy of the genetic code, one of ordinary skill in the art will immediately recognize that a large number of the nucleic acid molecules having a sequence at least 80%, 85%, 90%, 95%, 96%, 97%, 98%, 99%, or 100% identical to, for example, the nucleic acid sequence of the cDNA contained in Clone ID NO:Z, the nucleic

acid sequence referred to in Table 1 (SEQ ID NO:X), the nucleic acid sequence disclosed in Table 2 (e.g,. the nucleic acid sequence delineated in columns 8 and 9) or fragments thereof, will encode polypeptides "having functional activity." In fact, since degenerate variants of any of these nucleotide sequences all encode the same polypeptide, in many instances, this will be clear to the skilled artisan even without performing the above described comparison assay. It will be further recognized in the art that, for such nucleic acid molecules that are not degenerate variants, a reasonable number will also encode a polypeptide having functional activity. This is because the skilled artisan is fully aware of amino acid substitutions that are either less likely or not likely to significantly effect protein function (e.g., replacing one aliphatic amino acid with a second aliphatic amino acid), as further described below.

[0116] For example, guidance concerning how to make phenotypically silent amino acid substitutions is provided in Bowie et al., "Deciphering the Message in Protein Sequences: Tolerance to Amino Acid Substitutions," Science 247:1306-1310 (1990), wherein the authors indicate that there are two main strategies for studying the tolerance of an amino acid sequence to change.

[0117] The first strategy exploits the tolerance of amino acid substitutions by natural selection during the process of evolution. By comparing amino acid sequences in different species, conserved amino acids can be identified. These conserved amino acids are likely important for protein function. In contrast, the amino acid positions where substitutions have been tolerated by natural selection indicates that these positions are not critical for protein function. Thus, positions tolerating amino acid substitution could be modified while still maintaining biological activity of the protein.

[0118] The second strategy uses genetic engineering to introduce amino acid changes at specific positions of a cloned gene to identify regions critical for protein function. For example, site directed mutagenesis or alanine-scanning mutagenesis (introduction of single alanine mutations at every residue in the molecule) can be used. See Cunningham and Wells, Science 244:1081-1085 (1989). The resulting mutant molecules can then be tested for biological activity.

[0119] As the authors state, these two strategies have revealed that proteins are surprisingly tolerant of amino acid substitutions. The authors further indicate which amino acid changes are likely to be permissive at certain amino acid positions in the protein. For example, most buried (within the tertiary structure of the protein) amino acid residues require

nonpolar side chains, whereas few features of surface side chains are generally conserved. Moreover, tolerated conservative amino acid substitutions involve replacement of the aliphatic or hydrophobic amino acids Ala, Val, Leu and Ile; replacement of the hydroxyl residues Ser and Thr; replacement of the acidic residues Asp and Glu; replacement of the amide residues Asn and Gln, replacement of the basic residues Lys, Arg, and His; replacement of the aromatic residues Phe, Tyr, and Trp, and replacement of the small-sized amino acids Ala, Ser, Thr, Met, and Gly. Besides conservative amino acid substitution, variants of the present invention include (i) substitutions with one or more of the non-conserved amino acid residues, where the substituted amino acid residues may or may not be one encoded by the genetic code, or (ii) substitutions with one or more of the amino acid residues having a substituent group, or (iii) fusion of the mature polypeptide with another compound, such as a compound to increase the stability and/or solubility of the polypeptide (for example, polyethylene glycol), (iv) fusion of the polypeptide with additional amino acids, such as, for example, an IgG Fc fusion region peptide, serum albumin (preferably human serum albumin) or a fragment thereof, or leader or secretory sequence, or a sequence facilitating purification, or (v) fusion of the polypeptide with another compound, such as albumin (including but not limited to recombinant albumin (see, e.g., U.S. Patent No. 5,876,969, issued March 2, 1999, EP Patent 0 413 622, and U.S. Patent No. 5,766,883, issued June 16, 1998, herein incorporated by reference in their entirety)). Such variant polypeptides are deemed to be within the scope of those skilled in the art from the teachings herein.

[0120] For example, polypeptide variants containing amino acid substitutions of charged amino acids with other charged or neutral amino acids may produce proteins with improved characteristics, such as less aggregation. Aggregation of pharmaceutical formulations both reduces activity and increases clearance due to the aggregate's immunogenic activity. See Pinckard et al., Clin. Exp. Immunol. 2:331-340 (1967); Robbins et al., Diabetes 36: 838-845 (1987); Cleland et al., Crit. Rev. Therapeutic Drug Carrier Systems 10:307-377 (1993).

[0121] A further embodiment of the invention relates to polypeptides which comprise the amino acid sequence of a polypeptide having an amino acid sequence which contains at least one amino acid substitution, but not more than 50 amino acid substitutions, even more preferably, not more than 40 amino acid substitutions, still more preferably, not more than 30 amino acid substitutions, and still even more preferably, not more than 20 amino acid

substitutions from a polypeptide sequence disclosed herein. Of course it is highly preferable for a polypeptide to have an amino acid sequence which comprises the amino acid sequence of a polypeptide of SEQ ID NO:Y, an amino acid sequence encoded by SEQ ID NO:X, an amino acid sequence encoded by the portion of SEQ ID NO:X as defined in columnns 8 and 9 of Table 2, an amino acid sequence encoded by the complement of SEQ ID NO:X, and/or an amino acid sequence encoded by cDNA contained in Clone ID NO:Z which contains, in order of ever-increasing preference, at least one, but not more than 10, 9, 8, 7, 6, 5, 4, 3, 2 or 1 amino acid substitutions.

[0122] In specific embodiments, the polypeptides of the invention comprise, or alternatively, consist of, fragments or variants of a reference amino acid sequence selected from: (a) the amino acid sequence of SEQ ID NO:Y or fragments thereof (e.g., the mature form and/or other fragments described herein); (b) the amino acid sequence encoded by SEQ ID NO:X or fragments thereof; (c) the amino acid sequence encoded by the complement of SEQ ID NO:X or fragments thereof; (d) the amino acid sequence encoded by the portion of SEQ ID NO:X as defined in columns 8 and 9 of Table 2 or fragments thereof; and (e) the amino acid sequence encoded by cDNA contained in Clone ID NO:Z or fragments thereof; wherein the fragments or variants have 1-5, 5-10, 5-25, 5-50, 10-50 or 50-150, amino acid residue additions, substitutions, and/or deletions when compared to the reference amino acid sequence. In preferred embodiments, the amino acid substitutions are conservative. Polynucleotides encoding these polypeptides are also encompassed by the invention.

Polynucleotide and Polypeptide Fragments

[0123] The present invention is also directed to polynucleotide fragments of the polynucleotides (nucleic acids) of the invention. In the present invention, a "polynucleotide fragment" refers to a polynucleotide having a nucleic acid sequence which, for example: is a portion of the cDNA contained in Clone ID NO:Z or the complementary strand thereto; is a portion of the polynucleotide sequence encoding the polypeptide encoded by the cDNA contained in Clone ID NO:Z or the complementary strand thereto; is a portion of a polynucleotide sequence encoding the amino acid sequence encoded by the region of SEQ ID NO:X as defined in columns 8 and 9 of Table 2 or the complementary strand thereto; is a portion of the polynucleotide sequence of SEQ ID NO:X as defined in columns 8 and 9 of Table 2 or the complementary strand thereto; is a portion of the polynucleotide sequence in

SEQ ID NO:X or the complementary strand thereto; is a polynucleotide sequence encoding a portion of the polypeptide of SEQ ID NO:Y; is a polynucleotide sequence encoding a portion of a polypeptide encoded by SEQ ID NO:X; or is a polynucleotide sequence encoding a portion of a polypeptide encoded by the complement of the polynucleotide sequence in SEQ ID NO:X.

[0124] The polynucleotide fragments of the invention are preferably at least about 15 nt, and more preferably at least about 20 nt, still more preferably at least about 30 nt, and even more preferably, at least about 40 nt, at least about 50 nt, at least about 75 nt, or at least about 150 nt in length. A fragment "at least 20 nt in length," for example, is intended to include 20 or more contiguous bases from the cDNA sequence contained in Clone ID NO:Z, or the nucleotide sequence shown in SEQ ID NO:X or the complementary stand thereto. In this context "about" includes the particularly recited value or a value larger or smaller by several (5, 4, 3, 2, or 1) nucleotides, at either terminus or at both termini. These nucleotide fragments have uses that include, but are not limited to, as diagnostic probes and primers as discussed herein. Of course, larger fragments (e.g., at least 160, 170, 180, 190, 200, 250, 500, 600, 1000, or 2000 nucleotides in length) are also encompassed by the invention.

[0125] Moreover, representative examples of polynucleotide fragments of the invention comprise, or alternatively consist of, a sequence from about nucleotide number 1-50, 51-100, 101-150, 151-200, 201-250, 251-300, 301-350, 351-400, 401-450, 451-500, 501-550, 551-600, 601-650, 651-700, 701-750, 751-800, 801-850, 851-900, 901-950, 951-1000, 1001-1050, 1051-1100, 1101-1150, 1151-1200, 1201-1250, 1251-1300, 1301-1350, 1351-1400, 1401-1450, 1451-1500, 1501-1550, 1551-1600, 1601-1650, 1651-1700, 1701-1750, 1751-1800, 1801-1850, 1851-1900, 1901-1950, 1951-2000, 2001-2050, 2051-2100, 2101-2150, 2151-2200, 2201-2250, 2251-2300, 2301-2350, 2351-2400, 2401-2450, 2451-2500, 2501-2550, 2551-2600, 2601-2650, 2651-2700, 2701-2750, 2751-2800, 2801-2850, 2851-2900, 2901-2950, 2951-3000, 3001-3050, 3051-3100, 3101-3150, 3151-3200, 3201-3250, 3251-3300, 3301-3350, 3351-3400, 3401-3450, 3451-3500, 3501-3550, 3551-3600, 3601-3650, 3651-3700, 3701-3750, 3751-3800, 3801-3850, 3851-3900, 3901-3950, 3951-4000, 4001-4050, 4051-4100, 4101-4150, 4151-4200, 4201-4250, 4251-4300, 4301-4350, 4351-4400, 4401-4450, 4451-4500, 4501-4550, 4551-4600, 4601-4650, 4651-4700, 4701-4750, 4751-4800, 4801-4850, 4851-4900, 4901-4950, 4951-5000, 5001-5050, 5051-5100, 5101-5150, 5151-5200, 5201-5250, 5251-5300, 5301-5350, 5351-5400, 5401-5450, 5451-5500, 5501-

5550, 5551-5600, 5601-5650, 5651-5700, 5701-5750, 5751-5800, 5801-5850, 5851-5900, 5901-5950, 5951-6000, 6001-6050, 6051-6100, 6101-6150, 6151-6200, 6201-6250, 6251-6300, 6301-6350, 6351-6400, 6401-6450, 6451-6500, 6501-6550, 6551-6600, 6601-6650, 6651-6700, 6701-6750, 6751-6800, 6801-6850, 6851-6900, 6901-6950, 6951-7000, 7001-7050, 7051-7100, 7101-7150, 7151-7200, 7201-7250, 7251-7300 or 7301 to the end of SEQ ID NO:X, or the complementary strand thereto. In this context "about" includes the particularly recited range or a range larger or smaller by several (5, 4, 3, 2, or 1) nucleotides, at either terminus or at both termini. Preferably, these fragments encode a polypeptide which has a functional activity (e.g., biological activity). More preferably, these polynucleotides can be used as probes or primers as discussed herein. Polynucleotides which hybridize to one or more of these polynucleotides under stringent hybridization conditions or alternatively, under lower stringency conditions are also encompassed by the invention, as are polypeptides encoded by these polynucleotides.

[0126] Further representative examples of polynucleotide fragments of the invention comprise, or alternatively consist of, a sequence from about nucleotide number 1-50, 51-100, 101-150, 151-200, 201-250, 251-300, 301-350, 351-400, 401-450, 451-500, 501-550, 551-600, 601-650, 651-700, 701-750, 751-800, 801-850, 851-900, 901-950, 951-1000, 1001-1050, 1051-1100, 1101-1150, 1151-1200, 1201-1250, 1251-1300, 1301-1350, 1351-1400, 1401-1450, 1451-1500, 1501-1550, 1551-1600, 1601-1650, 1651-1700, 1701-1750, 1751-1800, 1801-1850, 1851-1900, 1901-1950, 1951-2000, 2001-2050, 2051-2100, 2101-2150, 2151-2200, 2201-2250, 2251-2300, 2301-2350, 2351-2400, 2401-2450, 2451-2500, 2501-2550, 2551-2600, 2601-2650, 2651-2700, 2701-2750, 2751-2800, 2801-2850, 2851-2900, 2901-2950, 2951-3000, 3001-3050, 3051-3100, 3101-3150, 3151-3200, 3201-3250, 3251-3300, 3301-3350, 3351-3400, 3401-3450, 3451-3500, 3501-3550, 3551-3600, 3601-3650, 3651-3700, 3701-3750, 3751-3800, 3801-3850, 3851-3900, 3901-3950, 3951-4000, 4001-4050, 4051-4100, 4101-4150, 4151-4200, 4201-4250, 4251-4300, 4301-4350, 4351-4400, 4401-4450, 4451-4500, 4501-4550, 4551-4600, 4601-4650, 4651-4700, 4701-4750, 4751-4800, 4801-4850, 4851-4900, 4901-4950, 4951-5000, 5001-5050, 5051-5100, 5101-5150, 5151-5200, 5201-5250, 5251-5300, 5301-5350, 5351-5400, 5401-5450, 5451-5500, 5501-5550, 5551-5600, 5601-5650, 5651-5700, 5701-5750, 5751-5800, 5801-5850, 5851-5900, 5901-5950, 5951-6000, 6001-6050, 6051-6100, 6101-6150, 6151-6200, 6201-6250, 6251-6300, 6301-6350, 6351-6400, 6401-6450, 6451-6500, 6501-6550, 6551-6600, 6601-6650,

6651-6700, 6701-6750, 6751-6800, 6801-6850, 6851-6900, 6901-6950, 6951-7000, 7001-7050, 7051-7100, 7101-7150, 7151-7200, 7201-7250, 7251-7300 or 7301 to the end of the cDNA sequence contained in Clone ID NO:Z, or the complementary strand thereto. In this context "about" includes the particularly recited range or a range larger or smaller by several (5, 4, 3, 2, or 1) nucleotides, at either terminus or at both termini. Preferably, these fragments encode a polypeptide which has a functional activity (e.g., biological activity). More preferably, these polynucleotides can be used as probes or primers as discussed herein. Polynucleotides which hybridize to one or more of these polynucleotides under stringent hybridization conditions or alternatively, under lower stringency conditions are also encompassed by the invention, as are polypeptides encoded by these polynucleotides.

[0127] In the present invention, a "polypeptide fragment" refers to an amino acid sequence which is a portion of that contained in SEQ ID NO:Y, a portion of an amino acid sequence encoded by the portion of SEQ ID NO:X as defined in columnns 8 and 9 of Table 2, a portion of an amino acid sequence encoded by the polynucleotide sequence of SEQ ID NO:X, a portion of an amino acid sequence encoded by the complement of the polynucleotide sequence in SEQ ID NO:X, and/or a portion of an amino acid sequence encoded by the cDNA contained in Clone ID NO:Z. Protein (polypeptide) fragments may be "free-standing," or comprised within a larger polypeptide of which the fragment forms a part or region, most preferably as a single continuous region. Representative examples of polypeptide fragments of the invention, include, for example, fragments comprising, or alternatively consisting of, from about amino acid number 1-20, 21-40, 41-60, 61-80, 81-100, 101-120, 121-140, 141-160, 161-180, 181-200, 201-220, 221-240, 241-260, 261-280, 281-300, 301-320, 321-340, 341-360, 361-380, 381-400, 401-420, 421-440, 441-460, 461-480, 481-500, 501-520, 521-540, 541-560, 561-580, 581-600, 601-620, 621-640, 641-660, 661-680, 681-700, 701-720, 721-740, 741-760, 761-780, 781-800, 801-820, 821-840, 841-860, 861-880, 881-900, 901-920, 921-940, 941-960, 961-980, 981-1000, 1001-1020, 1021-1040, 1041-1060, 1061-1080, 1081-1100, 1101-1120, 1121-1140, 1141-1160, 1161-1180, 1181-1200, 1201-1220, 1221-1240, 1241-1260, 1261-1280, 1281-1300, 1301-1320, 1321-1340, 1341-1360, 1361-1380, 1381-1400, 1401-1420, 1421-1440, or 1441 to the end of the coding region of cDNA and SEQ ID NO: Y. In a preferred embodiment, polypeptide fragments of the invention include, for example, fragments comprising, or alternatively consisting of, from about amino acid number 1-20, 21-40, 41-60, 61-80, 81-100, 101-120, 121-140, 141-160,

161-180, 181-200, 201-220, 221-240, 241-260, 261-280, 281-300, 301-320, 321-340, 341-360, 361-380, 381-400, 401-420, 421-440, 441-460, 461-480, 481-500, 501-520, 521-540, 541-560, 561-580, 581-600, 601-620, 621-640, 641-660, 661-680, 681-700, 701-720, 721-740, 741-760, 761-780, 781-800, 801-820, 821-840, 841-860, 861-880, 881-900, 901-920, 921-940, 941-960, 961-980, 981-1000, 1001-1020, 1021-1040, 1041-1060, 1061-1080, 1081-1100, 1101-1120, 1121-1140, 1141-1160, 1161-1180, 1181-1200, 1201-1220, 1221-1240, 1241-1260, 1261-1280, 1281-1300, 1301-1320, 1321-1340, 1341-1360, 1361-1380, 1381-1400, 1401-1420, 1421-1440, or 1441 to the end of the coding region of SEQ ID NO:Y. Moreover, polypeptide fragments of the invention may be at least about 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 100, 110, 120, 130, 140, or 150 amino acids in length. In this context "about" includes the particularly recited ranges or values, or ranges or values larger or smaller by several (5, 4, 3, 2, or 1) amino acids, at either extreme or at both extremes. Polynucleotides encoding these polypeptide fragments are also encompassed by the invention.

[0128] Even if deletion of one or more amino acids from the N-terminus of a protein results in modification of loss of one or more biological functions of the protein, other functional activities (e.g., biological activities, ability to multimerize, ability to bind a ligand) may still be retained. For example, the ability of shortened muteins to induce and/or bind to antibodies which recognize the complete or mature forms of the polypeptides generally will be retained when less than the majority of the residues of the complete or mature polypeptide are removed from the N-terminus. Whether a particular polypeptide lacking N-terminal residues of a complete polypeptide retains such immunologic activities can readily be determined by routine methods described herein and otherwise known in the art. It is not unlikely that a mutein with a large number of deleted N-terminal amino acid residues may retain some biological or immunogenic activities. In fact, peptides composed of as few as six amino acid residues may often evoke an immune response.

[0129] Accordingly, polypeptide fragments include the secreted protein as well as the mature form. Further preferred polypeptide fragments include the secreted protein or the mature form having a continuous series of deleted residues from the amino or the carboxy terminus, or both. For example, any number of amino acids, ranging from 1-60, can be deleted from the amino terminus of either the secreted polypeptide or the mature form. Similarly, any number of amino acids, ranging from 1-30, can be deleted from the carboxy

terminus of the secreted protein or mature form. Furthermore, any combination of the above amino and carboxy terminus deletions are preferred. Similarly, polynucleotides encoding these polypeptide fragments are also preferred.

[0130] The present invention further provides polypeptides having one or more residues deleted from the amino terminus of the amino acid sequence of a polypeptide disclosed herein (e.g., a polypeptide of SEQ ID NO:Y, a polypeptide encoded by the polynucleotide sequence contained in SEQ ID NO:X or the complement thereof, a polypeptide encoded by the portion of SEQ ID NO:X as defined in columns 8 and 9 of Table 2, and/or a polypeptide encoded by the cDNA contained in Clone ID NO:Z). In particular, N-terminal deletions may be described by the general formula m-q, where q is a whole integer representing the total number of amino acid residues in a polypeptide of the invention (e.g., the polypeptide disclosed in SEQ ID NO:Y, or the polypeptide encoded by the portion of SEQ ID NO:X as defined in columns 8 and 9 of Table 2), and m is defined as any integer ranging from 2 to q-6. Polynucleotides encoding these polypeptides are also encompassed by the invention.

[0131] The present invention further provides polypeptides having one or more residues from the carboxy terminus of the amino acid sequence of a polypeptide disclosed herein (e.g., a polypeptide of SEQ ID NO:Y, a polypeptide encoded by the polynucleotide sequence contained in SEQ ID NO:X, a polypeptide encoded by the portion of SEQ ID NO:X as defined in columns 8 and 9 of Table 2, and/or a polypeptide encoded by the cDNA contained in Clone ID NO:Z). In particular, C-terminal deletions may be described by the general formula 1-n, where n is any whole integer ranging from 6 to q-1, and where n corresponds to the position of amino acid residue in a polypeptide of the invention. Polynucleotides encoding these polypeptides are also encompassed by the invention.

[0132] In addition, any of the above described N- or C-terminal deletions can be combined to produce a N- and C-terminal deleted polypeptide. The invention also provides polypeptides having one or more amino acids deleted from both the amino and the carboxyl termini, which may be described generally as having residues m-n of a polypeptide encoded by SEQ ID NO:X (e.g., including, but not limited to, the preferred polypeptide disclosed as SEQ ID NO:Y and the polypeptide encoded by the portion of SEQ ID NO:X as defined in columns 8 and 9 of Table 2), the cDNA contained in Clone ID NO:Z, and/or the complement thereof, where n and m are integers as described above. Polynucleotides encoding these polypeptides are also encompassed by the invention.

[0133] Also as mentioned above, even if deletion of one or more amino acids from the C-terminus of a protein results in modification of loss of one or more biological functions of the protein, other functional activities (e.g., biological activities, ability to multimerize, ability to bind a ligand) may still be retained. For example the ability of the shortened mutein to induce and/or bind to antibodies which recognize the complete or mature forms of the polypeptide generally will be retained when less than the majority of the residues of the complete or mature polypeptide are removed from the C-terminus. Whether a particular polypeptide lacking C-terminal residues of a complete polypeptide retains such immunologic activities can readily be determined by routine methods described herein and otherwise known in the art. It is not unlikely that a mutein with a large number of deleted C-terminal amino acid residues may retain some biological or immunogenic activities. In fact, peptides composed of as few as six amino acid residues may often evoke an immune response.

[0134] The present application is also directed to proteins containing polypeptides at least 80%, 85%, 90%, 95%, 96%, 97%, 98% or 99% identical to a polypeptide sequence set forth herein. In preferred embodiments, the application is directed to proteins containing polypeptides at least 80%, 85%, 90%, 95%, 96%, 97%, 98% or 99% identical to polypeptides having the amino acid sequence of the specific N- and C-terminal deletions. Polynucleotides encoding these polypeptides are also encompassed by the invention.

[0135] Any polypeptide sequence encoded by, for example, the polynucleotide sequences set forth as SEQ ID NO:X or the complement thereof, (presented, for example, in Tables 1 and 2), or the cDNA contained in Clone ID NO:Z, may be analyzed to determine certain preferred regions of the polypeptide. For example, the amino acid sequence of a polypeptide encoded by a polynucleotide sequence of SEQ ID NO:X (e.g., the polypeptide of SEQ ID NO:Y and the polypeptide encoded by the portion of SEQ ID NO:X as defined in columnns 8 and 9 of Table 2) or the cDNA contained in Clone ID NO:Z may be analyzed using the default parameters of the DNASTAR computer algorithm (DNASTAR, Inc., 1228 S. Park St., Madison, WI 53715 USA; http://www.dnastar.com/).

[0136] Polypeptide regions that may be routinely obtained using the DNASTAR computer algorithm include, but are not limited to, Garnier-Robson alpha-regions, beta-regions, turn-regions, and coil-regions; Chou-Fasman alpha-regions, beta-regions, and turn-regions; Kyte-Doolittle hydrophilic regions and hydrophobic regions; Eisenberg alpha- and beta-amphipathic regions; Karplus-Schulz flexible regions; Emini surface-forming regions;

and Jameson-Wolf regions of high antigenic index. Among highly preferred polynucleotides of the invention in this regard are those that encode polypeptides comprising regions that combine several structural features, such as several (e.g., 1, 2, 3 or 4) of the features set out above.

[0137] Additionally, Kyte-Doolittle hydrophilic regions and hydrophobic regions, Emini surface-forming regions, and Jameson-Wolf regions of high antigenic index (i.e., containing four or more contiguous amino acids having an antigenic index of greater than or equal to 1.5, as identified using the default parameters of the Jameson-Wolf program) can routinely be used to determine polypeptide regions that exhibit a high degree of potential for antigenicity. Regions of high antigenicity are determined from data by DNASTAR analysis by choosing values which represent regions of the polypeptide which are likely to be exposed on the surface of the polypeptide in an environment in which antigen recognition may occur in the process of initiation of an immune response.

[0138] Preferred polypeptide fragments of the invention are fragments comprising, or alternatively, consisting of, an amino acid sequence that displays a functional activity (e.g. biological activity) of the polypeptide sequence of which the amino acid sequence is a fragment. By a polypeptide displaying a "functional activity" is meant a polypeptide capable of one or more known functional activities associated with a full-length protein, such as, for example, biological activity, antigenicity, immunogenicity, and/or multimerization, as described herein.

[0139] Other preferred polypeptide fragments are biologically active fragments. Biologically active fragments are those exhibiting activity similar, but not necessarily identical, to an activity of the polypeptide of the present invention. The biological activity of the fragments may include an improved desired activity, or a decreased undesirable activity.

[0140] In preferred embodiments, polypeptides of the invention comprise, or alternatively consist of, one, two, three, four, five or more of the antigenic fragments of the polypeptide of SEQ ID NO:Y, or portions thereof. Polynucleotides encoding these polypeptides are also encompassed by the invention.

[0141] The present invention encompasses polypeptides comprising, or alternatively consisting of, an epitope of: the polypeptide sequence shown in SEQ ID NO:Y; a polypeptide sequence encoded by SEQ ID NO:X or the complementary strand thereto; the polypeptide sequence encoded by the portion of SEQ ID NO:X as defined in columns 8 and 9 of Table 2;

the polypeptide sequence encoded by the cDNA contained in Clone ID NO:Z; or the polypeptide sequence encoded by a polynucleotide that hybridizes to the sequence of SEQ ID NO:X, the complement of the sequence of SEQ ID NO:X, the complement of a portion of SEQ ID NO:X as defined in columns 8 and 9 of Table 2, or the cDNA sequence contained in Clone ID NO:Z under stringent hybridization conditions or alternatively, under lower stringency hybridization as defined *supra*. The present invention further encompasses polynucleotide sequences encoding an epitope of a polypeptide sequence of the invention (such as, for example, the sequence disclosed in SEQ ID NO:X, or a fragment thereof), polynucleotide sequences of the complementary strand of a polynucleotide sequence encoding an epitope of the invention, and polynucleotide sequences which hybridize to the complementary strand under stringent hybridization conditions or alternatively, under lower stringency hybridization conditions defined *supra*.

[0142] The term "epitopes," as used herein, refers to portions of a polypeptide having antigenic or immunogenic activity in an animal, preferably a mammal, and most preferably in a human. In a preferred embodiment, the present invention encompasses a polypeptide comprising an epitope, as well as the polynucleotide encoding this polypeptide. An "immunogenic epitope," as used herein, is defined as a portion of a protein that elicits an antibody response in an animal, as determined by any method known in the art, for example, by the methods for generating antibodies described *infra*. (See, for example, Geysen et al., Proc. Natl. Acad. Sci. USA 81:3998- 4002 (1983)). The term "antigenic epitope," as used herein, is defined as a portion of a protein to which an antibody can immunospecifically bind its antigen as determined by any method well known in the art, for example, by the immunoassays described herein. Immunospecific binding excludes non-specific binding but does not necessarily exclude cross- reactivity with other antigens. Antigenic epitopes need not necessarily be immunogenic.

[0143] Fragments which function as epitopes may be produced by any conventional means. (See, e.g., Houghten, R. A., Proc. Natl. Acad. Sci. USA 82:5131-5135 (1985) further described in U.S. Patent No. 4,631,211.)

[0144] In the present invention, antigenic epitopes preferably contain a sequence of at least 4, at least 5, at least 6, at least 7, more preferably at least 8, at least 9, at least 10, at least 11, at least 12, at least 13, at least 14, at least 15, at least 20, at least 25, at least 30, at least 40, at least 50, and, most preferably, between about 15 to about 30 amino acids. Preferred

polypeptides comprising immunogenic or antigenic epitopes are at least 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95, or 100 amino acid residues in length. Additional non-exclusive preferred antigenic epitopes include the antigenic epitopes disclosed herein, as well as portions thereof. Antigenic epitopes are useful, for example, to raise antibodies, including monoclonal antibodies, that specifically bind the epitope. Preferred antigenic epitopes include the antigenic epitopes disclosed herein, as well as any combination of two, three, four, five or more of these antigenic epitopes. Antigenic epitopes can be used as the target molecules in immunoassays. (See, for instance, Wilson et al., Cell 37:767-778 (1984); Sutcliffe et al., Science 219:660-666 (1983)).

[0145] Non-limiting examples of epitopes of polypeptides that can be used to generate antibodies of the invention include a polypeptide comprising, or alternatively consisting of, at least one, two, three, four, five, six or more of the portion(s) of SEQ ID NO:Y specified in column 7 of Table 1. These polypeptide fragments have been determined to bear antigenic epitopes of the proteins of the invention by the analysis of the Jameson-Wolf antigenic index which is included in the DNAStar suite of computer programs. By "comprise" it is intended that a polypeptide contains at least one, two, three, four, five, six or more of the portion(s) of SEQ ID NO:Y shown in column 7 of Table 1, but it may contain additional flanking residues on either the amino or carboxyl termini of the recited portion. Such additional flanking sequences are preferably sequences naturally found adjacent to the portion; i.e., contiguous sequence shown in SEQ ID NO:Y. The flanking sequence may, however, be sequences from a heterolgous polypeptide, such as from another protein described herein or from a heterologous polypeptide not described herein. In particular embodiments, epitope portions of a polypeptide of the invention comprise one, two, three, or more of the portions of SEQ ID NO:Y shown in column 7 of Table 1.

[0146] Similarly, immunogenic epitopes can be used, for example, to induce antibodies according to methods well known in the art. See, for instance, Sutcliffe et al., *supra*; Wilson et al., *supra*; Chow et al., Proc. Natl. Acad. Sci. USA 82:910-914; and Bittle et al., J. Gen. Virol. 66:2347-2354 (1985). Preferred immunogenic epitopes include the immunogenic epitopes disclosed herein, as well as any combination of two, three, four, five or more of these immunogenic epitopes. The polypeptides comprising one or more immunogenic epitopes may be presented for eliciting an antibody response together with a carrier protein, such as an albumin, to an animal system (such as rabbit or mouse), or, if the polypeptide is of

sufficient length (at least about 25 amino acids), the polypeptide may be presented without a carrier. However, immunogenic epitopes comprising as few as 8 to 10 amino acids have been shown to be sufficient to raise antibodies capable of binding to, at the very least, linear epitopes in a denatured polypeptide (e.g., in Western blotting).

[0147] Epitope-bearing polypeptides of the present invention may be used to induce antibodies according to methods well known in the art including, but not limited to, *in vivo* immunization, in vitro immunization, and phage display methods. See, e.g., Sutcliffe et al., *supra*; Wilson et al., *supra*, and Bittle et al., J. Gen. Virol., 66:2347-2354 (1985). If *in vivo* immunization is used, animals may be immunized with free peptide; however, anti-peptide antibody titer may be boosted by coupling the peptide to a macromolecular carrier, such as keyhole limpet hemacyanin (KLH) or tetanus toxoid. For instance, peptides containing cysteine residues may be coupled to a carrier using a linker such as maleimidobenzoyl- N-hydroxysuccinimide ester (MBS), while other peptides may be coupled to carriers using a more general linking agent such as glutaraldehyde. Animals such as rabbits, rats and mice are immunized with either free or carrier- coupled peptides, for instance, by intraperitoneal and/or intradermal injection of emulsions containing about 100 μg of peptide or carrier protein and Freund's adjuvant or any other adjuvant known for stimulating an immune response. Several booster injections may be needed, for instance, at intervals of about two weeks, to provide a useful titer of anti-peptide antibody which can be detected, for example, by ELISA assay using free peptide adsorbed to a solid surface. The titer of anti-peptide antibodies in serum from an immunized animal may be increased by selection of anti-peptide antibodies, for instance, by adsorption to the peptide on a solid support and elution of the selected antibodies according to methods well known in the art.

[0148] As one of skill in the art will appreciate, and as discussed above, the polypeptides of the present invention (e.g., those comprising an immunogenic or antigenic epitope) can be fused to heterologous polypeptide sequences. For example, polypeptides of the present invention (including fragments or variants thereof), may be fused with the constant domain of immunoglobulins (IgA, IgE, IgG, IgM), or portions thereof (CH1, CH2, CH3, or any combination thereof and portions thereof, resulting in chimeric polypeptides. By way of another non-limiting example, polypeptides and/or antibodies of the present invention (including fragments or variants thereof) may be fused with albumin (including but not limited to recombinant human serum albumin or fragments or variants thereof (see, e.g., U.S.

Patent No. 5,876,969, issued March 2, 1999, EP Patent 0 413 622, and U.S. Patent No. 5,766,883, issued June 16, 1998, herein incorporated by reference in their entirety)). In a preferred embodiment, polypeptides and/or antibodies of the present invention (including fragments or variants thereof) are fused with the mature form of human serum albumin (i.e., amino acids 1 – 585 of human serum albumin as shown in Figures 1 and 2 of EP Patent 0 322 094) which is herein incorporated by reference in its entirety. In another preferred embodiment, polypeptides and/or antibodies of the present invention (including fragments or variants thereof) are fused with polypeptide fragments comprising, or alternatively consisting of, amino acid residues 1-z of human serum albumin, where z is an integer from 369 to 419, as described in U.S. Patent 5,766,883 herein incorporated by reference in its entirety. Polypeptides and/or antibodies of the present invention (including fragments or variants thereof) may be fused to either the N- or C-terminal end of the heterologous protein (e.g., immunoglobulin Fc polypeptide or human serum albumin polypeptide). Polynucleotides encoding fusion proteins of the invention are also encompassed by the invention.

[0149] Such fusion proteins as those described above may facilitate purification and may increase half-life *in vivo*. This has been shown for chimeric proteins consisting of the first two domains of the human CD4-polypeptide and various domains of the constant regions of the heavy or light chains of mammalian immunoglobulins. See, e.g., EP 394,827; Traunecker et al., Nature, 331:84-86 (1988). Enhanced delivery of an antigen across the epithelial barrier to the immune system has been demonstrated for antigens (e.g., insulin) conjugated to an FcRn binding partner such as IgG or Fc fragments (see, e.g., PCT Publications WO 96/22024 and WO 99/04813). IgG fusion proteins that have a disulfide-linked dimeric structure due to the IgG portion desulfide bonds have also been found to be more efficient in binding and neutralizing other molecules than monomeric polypeptides or fragments thereof alone. See, e.g., Fountoulakis et al., J. Biochem., 270:3958-3964 (1995). Nucleic acids encoding the above epitopes can also be recombined with a gene of interest as an epitope tag (e.g., the hemagglutinin (HA) tag or flag tag) to aid in detection and purification of the expressed polypeptide. For example, a system described by Janknecht et al. allows for the ready purification of non-denatured fusion proteins expressed in human cell lines (Janknecht et al., 1991, Proc. Natl. Acad. Sci. USA 88:8972- 897). In this system, the gene of interest is subcloned into a vaccinia recombination plasmid such that the open reading frame of the gene is translationally fused to an amino-terminal tag consisting of six

histidine residues. The tag serves as a matrix binding domain for the fusion protein. Extracts from cells infected with the recombinant vaccinia virus are loaded onto Ni2+ nitriloacetic acid-agarose column and histidine-tagged proteins can be selectively eluted with imidazole-containing buffers.

Fusion Proteins

[0150] Any polypeptide of the present invention can be used to generate fusion proteins. For example, the polypeptide of the present invention, when fused to a second protein, can be used as an antigenic tag. Antibodies raised against the polypeptide of the present invention can be used to indirectly detect the second protein by binding to the polypeptide. Moreover, because secreted proteins target cellular locations based on trafficking signals, polypeptides of the present invention which are shown to be secreted can be used as targeting molecules once fused to other proteins.

[0151] Examples of domains that can be fused to polypeptides of the present invention include not only heterologous signal sequences, but also other heterologous functional regions. The fusion does not necessarily need to be direct, but may occur through linker sequences.

[0152] In certain preferred embodiments, proteins of the invention are fusion proteins comprising an amino acid sequence that is an N and/or C- terminal deletion of a polypeptide of the invention. In preferred embodiments, the invention is directed to a fusion protein comprising an amino acid sequence that is at least 90%, 95%, 96%, 97%, 98% or 99% identical to a polypeptide sequence of the invention. Polynucleotides encoding these proteins are also encompassed by the invention.

[0153] Moreover, fusion proteins may also be engineered to improve characteristics of the polypeptide of the present invention. For instance, a region of additional amino acids, particularly charged amino acids, may be added to the N-terminus of the polypeptide to improve stability and persistence during purification from the host cell or subsequent handling and storage. Also, peptide moieties may be added to the polypeptide to facilitate purification. Such regions may be removed prior to final preparation of the polypeptide. The addition of peptide moieties to facilitate handling of polypeptides are familiar and routine techniques in the art.

[0154] As one of skill in the art will appreciate that, as discussed above, polypeptides of the present invention, and epitope-bearing fragments thereof, can be combined with heterologous polypeptide sequences. For example, the polypeptides of the present invention may be fused with heterologous polypeptide sequences, for example, the polypeptides of the present invention may be fused with the constant domain of immunoglobulins (IgA, IgE, IgG, IgM) or portions thereof (CH1, CH2, CH3, and any combination thereof, including both entire domains and portions thereof), or albumin (including, but not limited to, native or recombinant human albumin or fragments or variants thereof (see, e.g., U.S. Patent No. 5,876,969, issued March 2, 1999, EP Patent 0 413 622, and U.S. Patent No. 5,766,883, issued June 16, 1998, herein incorporated by reference in their entirety)), resulting in chimeric polypeptides. For example, EP-A-O 464 533 (Canadian counterpart 2045869) discloses fusion proteins comprising various portions of constant region of immunoglobulin molecules together with another human protein or part thereof. In many cases, the Fc part in a fusion protein is beneficial in therapy and diagnosis, and thus can result in, for example, improved pharmacokinetic properties (EP-A 0232 262). Alternatively, deleting the Fc part after the fusion protein has been expressed, detected, and purified, would be desired. For example, the Fc portion may hinder therapy and diagnosis if the fusion protein is used as an antigen for immunizations. In drug discovery, for example, human proteins, such as hIL-5, have been fused with Fc portions for the purpose of high-throughput screening assays to identify antagonists of hIL-5. See, D. Bennett et al., J. Molecular Recognition 8:52-58 (1995); K. Johanson et al., J. Biol. Chem. 270:9459-9471 (1995).

[0155] Moreover, the polypeptides of the present invention can be fused to marker sequences, such as a polypeptide which facilitates purification of the fused polypeptide. In preferred embodiments, the marker amino acid sequence is a hexa-histidine peptide, such as the tag provided in a pQE vector (QIAGEN, Inc., 9259 Eton Avenue, Chatsworth, CA, 91311), among others, many of which are commercially available. As described in Gentz et al., Proc. Natl. Acad. Sci. USA 86:821-824 (1989), for instance, hexa-histidine provides for convenient purification of the fusion protein. Another peptide tag useful for purification, the "HA" tag, corresponds to an epitope derived from the influenza hemagglutinin protein (Wilson et al., Cell 37:767 (1984)).

[0156] Additional fusion proteins of the invention may be generated through the techniques of gene-shuffling, motif-shuffling, exon-shuffling, and/or codon-shuffling

(collectively referred to as "DNA shuffling"). DNA shuffling may be employed to modulate the activities of polypeptides of the invention, such methods can be used to generate polypeptides with altered activity, as well as agonists and antagonists of the polypeptides. See, generally, U.S. Patent Nos. 5,605,793; 5,811,238; 5,830,721; 5,834,252; and 5,837,458, and Patten et al., Curr. Opinion Biotechnol. 8:724-33 (1997); Harayama, Trends Biotechnol. 16(2):76-82 (1998); Hansson, et al., J. Mol. Biol. 287:265-76 (1999); and Lorenzo and Blasco, Biotechniques 24(2):308- 13 (1998) (each of these patents and publications are hereby incorporated by reference in its entirety). In one embodiment, alteration of polynucleotides corresponding to SEQ ID NO:X and the polypeptides encoded by these polynucleotides may be achieved by DNA shuffling. DNA shuffling involves the assembly of two or more DNA segments by homologous or site-specific recombination to generate variation in the polynucleotide sequence. In another embodiment, polynucleotides of the invention, or the encoded polypeptides, may be altered by being subjected to random mutagenesis by error-prone PCR, random nucleotide insertion or other methods prior to recombination. In another embodiment, one or more components, motifs, sections, parts, domains, fragments, etc., of a polynucleotide encoding a polypeptide of the invention may be recombined with one or more components, motifs, sections, parts, domains, fragments, etc. of one or more heterologous molecules.

[0157] Thus, any of these above fusions can be engineered using the polynucleotides or the polypeptides of the present invention.

Recombinant and Synthetic Production of Polypeptides of the Invention

[0158] The present invention also relates to vectors containing the polynucleotide of the present invention, host cells, and the production of polypeptides by synthetic and recombinant techniques. The vector may be, for example, a phage, plasmid, viral, or retroviral vector. Retroviral vectors may be replication competent or replication defective. In the latter case, viral propagation generally will occur only in complementing host cells.

[0159] The polynucleotides of the invention may be joined to a vector containing a selectable marker for propagation in a host. Generally, a plasmid vector is introduced in a precipitate, such as a calcium phosphate precipitate, or in a complex with a charged lipid. If the vector is a virus, it may be packaged in vitro using an appropriate packaging cell line and then transduced into host cells.

[0160] The polynucleotide insert should be operatively linked to an appropriate promoter, such as the phage lambda PL promoter, the E. coli lac, trp, phoA and tac promoters, the SV40 early and late promoters and promoters of retroviral LTRs, to name a few. Other suitable promoters will be known to the skilled artisan. The expression constructs will further contain sites for transcription initiation, termination, and, in the transcribed region, a ribosome binding site for translation. The coding portion of the transcripts expressed by the constructs will preferably include a translation initiating codon at the beginning and a termination codon (UAA, UGA or UAG) appropriately positioned at the end of the polypeptide to be translated.

[0161] As indicated, the expression vectors will preferably include at least one selectable marker. Such markers include dihydrofolate reductase, G418, glutamine synthase, or neomycin resistance for eukaryotic cell culture, and tetracycline, kanamycin or ampicillin resistance genes for culturing in E. coli and other bacteria. Representative examples of appropriate hosts include, but are not limited to, bacterial cells, such as E. coli, Streptomyces and Salmonella typhimurium cells; fungal cells, such as yeast cells (e.g., Saccharomyces cerevisiae or Pichia pastoris (ATCC Accession No. 201178)); insect cells such as Drosophila S2 and Spodoptera Sf9 cells; animal cells such as CHO, COS, 293, and Bowes melanoma cells; and plant cells. Appropriate culture mediums and conditions for the above-described host cells are known in the art.

[0162] Among vectors preferred for use in bacteria include pQE70, pQE60 and pQE-9, available from QIAGEN, Inc.; pBluescript vectors, Phagescript vectors, pNH8A, pNH16a, pNH18A, pNH46A, available from Stratagene Cloning Systems, Inc.; and ptrc99a, pKK223-3, pKK233-3, pDR540, pRIT5 available from Pharmacia Biotech, Inc. Among preferred eukaryotic vectors are pWLNEO, pSV2CAT, pOG44, pXT1 and pSG available from Stratagene; and pSVK3, pBPV, pMSG and pSVL available from Pharmacia. Preferred expression vectors for use in yeast systems include, but are not limited to pYES2, pYD1, pTEF1/Zeo, pYES2/GS, pPICZ, pGAPZ, pGAPZalph, pPIC9, pPIC3.5, pHIL-D2, pHIL-S1, pPIC3.5K, pPIC9K, and PAO815 (all available from Invitrogen, Carlbad, CA). Other suitable vectors will be readily apparent to the skilled artisan.

[0163] Vectors which use glutamine synthase (GS) or DHFR as the selectable markers can be amplified in the presence of the drugs methionine sulphoximine or methotrexate, respectively. An advantage of glutamine synthase based vectors are the availabilty of cell lines (e.g., the murine myeloma cell line, NS0) which are glutamine synthase negative.

Glutamine synthase expression systems can also function in glutamine synthase expressing cells (e.g., Chinese Hamster Ovary (CHO) cells) by providing additional inhibitor to prevent the functioning of the endogenous gene. A glutamine synthase expression system and components thereof are detailed in PCT publications: WO87/04462; WO86/05807; WO89/01036; WO89/10404; and WO91/06657, which are hereby incorporated in their entireties by reference herein. Additionally, glutamine synthase expression vectors can be obtained from Lonza Biologics, Inc. (Portsmouth, NH). Expression and production of monoclonal antibodies using a GS expression system in murine myeloma cells is described in Bebbington *et al.*, *Bio/technology* 10:169(1992) and in Biblia and Robinson *Biotechnol. Prog.* 11:1 (1995) which are herein incorporated by reference.

[0164] The present invention also relates to host cells containing the above-described vector constructs described herein, and additionally encompasses host cells containing nucleotide sequences of the invention that are operably associated with one or more heterologous control regions (e.g., promoter and/or enhancer) using techniques known of in the art. The host cell can be a higher eukaryotic cell, such as a mammalian cell (e.g., a human derived cell), or a lower eukaryotic cell, such as a yeast cell, or the host cell can be a prokaryotic cell, such as a bacterial cell. A host strain may be chosen which modulates the expression of the inserted gene sequences, or modifies and processes the gene product in the specific fashion desired. Expression from certain promoters can be elevated in the presence of certain inducers; thus expression of the genetically engineered polypeptide may be controlled. Furthermore, different host cells have characteristics and specific mechanisms for the translational and post-translational processing and modification (e.g., phosphorylation, cleavage) of proteins. Appropriate cell lines can be chosen to ensure the desired modifications and processing of the foreign protein expressed.

[0165] Introduction of the nucleic acids and nucleic acid constructs of the invention into the host cell can be effected by calcium phosphate transfection, DEAE-dextran mediated transfection, cationic lipid-mediated transfection, electroporation, transduction, infection, or other methods. Such methods are described in many standard laboratory manuals, such as Davis et al., Basic Methods In Molecular Biology (1986). It is specifically contemplated that the polypeptides of the present invention may in fact be expressed by a host cell lacking a recombinant vector.

[0166] In addition to encompassing host cells containing the vector constructs discussed

herein, the invention also encompasses primary, secondary, and immortalized host cells of vertebrate origin, particularly mammalian origin, that have been engineered to delete or replace endogenous genetic material (e.g., the coding sequence), and/or to include genetic material (e.g., heterologous polynucleotide sequences) that is operably associated with polynucleotides of the invention, and which activates, alters, and/or amplifies endogenous polynucleotides. For example, techniques known in the art may be used to operably associate heterologous control regions (e.g., promoter and/or enhancer) and endogenous polynucleotide sequences via homologous recombination (see, e.g., US Patent Number 5,641,670, issued June 24, 1997; International Publication Number WO 96/29411; International Publication Number WO 94/12650; Koller *et al., Proc. Natl. Acad. Sci. USA 86*:8932-8935 (1989); and Zijlstra *et al., Nature 342*:435-438 (1989), the disclosures of each of which are incorporated by reference in their entireties).

[0167] Polypeptides of the invention can be recovered and purified from recombinant cell cultures by well-known methods including ammonium sulfate or ethanol precipitation, acid extraction, anion or cation exchange chromatography, phosphocellulose chromatography, hydrophobic interaction chromatography, affinity chromatography, hydroxylapatite chromatography and lectin chromatography. Most preferably, high performance liquid chromatography ("HPLC") is employed for purification.

[0168] Polypeptides of the present invention can also be recovered from: products purified from natural sources, including bodily fluids, tissues and cells, whether directly isolated or cultured; products of chemical synthetic procedures; and products produced by recombinant techniques from a prokaryotic or eukaryotic host, including, for example, bacterial, yeast, higher plant, insect, and mammalian cells. Depending upon the host employed in a recombinant production procedure, the polypeptides of the present invention may be glycosylated or may be non-glycosylated. In addition, polypeptides of the invention may also include an initial modified methionine residue, in some cases as a result of host-mediated processes. Thus, it is well known in the art that the N-terminal methionine encoded by the translation initiation codon generally is removed with high efficiency from any protein after translation in all eukaryotic cells. While the N-terminal methionine on most proteins also is efficiently removed in most prokaryotes, for some proteins, this prokaryotic removal process is inefficient, depending on the nature of the amino acid to which the N-terminal methionine is covalently linked.

[0169] In one embodiment, the yeast *Pichia pastoris* is used to express polypeptides of the invention in a eukaryotic system. *Pichia pastoris* is a methylotrophic yeast which can metabolize methanol as its sole carbon source. A main step in the methanol metabolization pathway is the oxidation of methanol to formaldehyde using O_2. This reaction is catalyzed by the enzyme alcohol oxidase. In order to metabolize methanol as its sole carbon source, *Pichia pastoris* must generate high levels of alcohol oxidase due, in part, to the relatively low affinity of alcohol oxidase for O_2. Consequently, in a growth medium depending on methanol as a main carbon source, the promoter region of one of the two alcohol oxidase genes (*AOX1*) is highly active. In the presence of methanol, alcohol oxidase produced from the *AOX1* gene comprises up to approximately 30% of the total soluble protein in *Pichia pastoris*. See Ellis, S.B., *et al., Mol. Cell. Biol.* 5:1111-21 (1985); Koutz, P.J, *et al., Yeast* 5:167-77 (1989); Tschopp, J.F., *et al., Nucl. Acids Res.* 15:3859-76 (1987). Thus, a heterologous coding sequence, such as, for example, a polynucleotide of the present invention, under the transcriptional regulation of all or part of the *AOX1* regulatory sequence is expressed at exceptionally high levels in *Pichia* yeast grown in the presence of methanol.

[0170] In one example, the plasmid vector pPIC9K is used to express DNA encoding a polypeptide of the invention, as set forth herein, in a *Pichea* yeast system essentially as described in "*Pichia* Protocols: Methods in Molecular Biology," D.R. Higgins and J. Cregg, eds. The Humana Press, Totowa, NJ, 1998. This expression vector allows expression and secretion of a polypeptide of the invention by virtue of the strong *AOX1* promoter linked to the *Pichia pastoris* alkaline phosphatase (PHO) secretory signal peptide (i.e., leader) located upstream of a multiple cloning site.

[0171] Many other yeast vectors could be used in place of pPIC9K, such as, pYES2, pYD1, pTEF1/Zeo, pYES2/GS, pPICZ, pGAPZ, pGAPZalpha, pPIC9, pPIC3.5, pHIL-D2, pHIL-S1, pPIC3.5K, and PAO815, as one skilled in the art would readily appreciate, as long as the proposed expression construct provides appropriately located signals for transcription, translation, secretion (if desired), and the like, including an in-frame AUG as required.

[0172] In another embodiment, high-level expression of a heterologous coding sequence, such as, for example, a polynucleotide of the present invention, may be achieved by cloning

the heterologous polynucleotide of the invention into an expression vector such as, for example, pGAPZ or pGAPZalpha, and growing the yeast culture in the absence of methanol.

[0173] In addition to encompassing host cells containing the vector constructs discussed herein, the invention also encompasses primary, secondary, and immortalized host cells of vertebrate origin, particularly mammalian origin, that have been engineered to delete or replace endogenous genetic material (e.g., coding sequence), and/or to include genetic material (e.g., heterologous polynucleotide sequences) that is operably associated with polynucleotides of the invention, and which activates, alters, and/or amplifies endogenous polynucleotides. For example, techniques known in the art may be used to operably associate heterologous control regions (e.g., promoter and/or enhancer) and endogenous polynucleotide sequences via homologous recombination (see, e.g., U.S. Patent No. 5,641,670, issued June 24, 1997; International Publication No. WO 96/29411, published September 26, 1996; International Publication No. WO 94/12650, published August 4, 1994; Koller et al., Proc. Natl. Acad. Sci. USA 86:8932-8935 (1989); and Zijlstra et al., Nature 342:435-438 (1989), the disclosures of each of which are incorporated by reference in their entireties).

[0174] In addition, polypeptides of the invention can be chemically synthesized using techniques known in the art (e.g., see Creighton, 1983, Proteins: Structures and Molecular Principles, W.H. Freeman & Co., N.Y., and Hunkapiller et al., *Nature*, 310:105-111 (1984)). For example, a polypeptide corresponding to a fragment of a polypeptide can be synthesized by use of a peptide synthesizer. Furthermore, if desired, nonclassical amino acids or chemical amino acid analogs can be introduced as a substitution or addition into the polypeptide sequence. Non-classical amino acids include, but are not limited to, to the D-isomers of the common amino acids, 2,4-diaminobutyric acid, a-amino isobutyric acid, 4-aminobutyric acid, Abu, 2-amino butyric acid, g-Abu, e-Ahx, 6-amino hexanoic acid, Aib, 2-amino isobutyric acid, 3-amino propionic acid, ornithine, norleucine, norvaline, hydroxyproline, sarcosine, citrulline, homocitrulline, cysteic acid, t-butylglycine, t-butylalanine, phenylglycine, cyclohexylalanine, b-alanine, fluoro-amino acids, designer amino acids such as b-methyl amino acids, Ca-methyl amino acids, Na-methyl amino acids, and amino acid analogs in general. Furthermore, the amino acid can be D (dextrorotary) or L (levorotary).

[0175] The invention encompasses polypeptides of the present invention which are

differentially modified during or after translation, e.g., by glycosylation, acetylation, phosphorylation, amidation, derivatization by known protecting/blocking groups, proteolytic cleavage, linkage to an antibody molecule or other cellular ligand, etc. Any of numerous chemical modifications may be carried out by known techniques, including but not limited, to specific chemical cleavage by cyanogen bromide, trypsin, chymotrypsin, papain, V8 protease, $NaBH_4$; acetylation, formylation, oxidation, reduction; metabolic synthesis in the presence of tunicamycin; etc.

[0176] Additional post-translational modifications encompassed by the invention include, for example, e.g., N-linked or O-linked carbohydrate chains, processing of N-terminal or C-terminal ends), attachment of chemical moieties to the amino acid backbone, chemical modifications of N-linked or O-linked carbohydrate chains, and addition or deletion of an N-terminal methionine residue as a result of procaryotic host cell expression. The polypeptides may also be modified with a detectable label, such as an enzymatic, fluorescent, isotopic or affinity label to allow for detection and isolation of the protein.

[0177] Examples of suitable enzymes include horseradish peroxidase, alkaline phosphatase, beta-galactosidase, or acetylcholinesterase; examples of suitable prosthetic group complexes include streptavidin/biotin and avidin/biotin; examples of suitable fluorescent materials include umbelliferone, fluorescein, fluorescein isothiocyanate, rhodamine, dichlorotriazinylamine fluorescein, dansyl chloride or phycoerythrin; an example of a luminescent material includes luminol; examples of bioluminescent materials include luciferase, luciferin, and aequorin; and examples of suitable radioactive material include iodine (^{121}I, ^{123}I, ^{125}I, ^{131}I), carbon (^{14}C), sulfur (^{35}S), tritium (^{3}H), indium (^{111}In, ^{112}In, ^{113m}In, ^{115m}In), technetium (^{99}Tc, ^{99m}Tc), thallium (^{201}Ti), gallium (^{68}Ga, ^{67}Ga), palladium (^{103}Pd), molybdenum (^{99}Mo), xenon (^{133}Xe), fluorine (^{18}F), ^{153}Sm, ^{177}Lu, ^{159}Gd, ^{149}Pm, ^{140}La, ^{175}Yb, ^{166}Ho, ^{90}Y, ^{47}Sc, ^{186}Re, ^{188}Re, ^{142}Pr, ^{105}Rh, and ^{97}Ru.

[0178] In specific embodiments, a polypeptide of the present invention or fragment or variant thereof is attached to macrocyclic chelators that associate with radiometal ions, including but not limited to, ^{177}Lu, ^{90}Y, ^{166}Ho, and ^{153}Sm, to polypeptides. In a preferred embodiment, the radiometal ion associated with the macrocyclic chelators is ^{111}In. In another preferred embodiment, the radiometal ion associated with the macrocyclic chelator is ^{90}Y. In specific embodiments, the macrocyclic chelator is 1,4,7,10-tetraazacyclododecane-N,N',N",N'"-tetraacetic acid (DOTA). In other specific embodiments, DOTA is attached to an

antibody of the invention or fragment thereof via a linker molecule. Examples of linker molecules useful for conjugating DOTA to a polypeptide are commonly known in the art - see, for example, DeNardo et al., Clin Cancer Res. 4(10):2483-90 (1998); Peterson et al., Bioconjug. Chem. 10(4):553-7 (1999); and Zimmerman et al, Nucl. Med. Biol. 26(8):943-50 (1999); which are hereby incorporated by reference in their entirety.

[0179] As mentioned, the proteins of the invention may be modified by either natural processes, such as posttranslational processing, or by chemical modification techniques which are well known in the art. It will be appreciated that the same type of modification may be present in the same or varying degrees at several sites in a given polypeptide. Polypeptides of the invention may be branched, for example, as a result of ubiquitination, and they may be cyclic, with or without branching. Cyclic, branched, and branched cyclic polypeptides may result from posttranslation natural processes or may be made by synthetic methods. Modifications include acetylation, acylation, ADP-ribosylation, amidation, covalent attachment of flavin, covalent attachment of a heme moiety, covalent attachment of a nucleotide or nucleotide derivative, covalent attachment of a lipid or lipid derivative, covalent attachment of phosphotidylinositol, cross-linking, cyclization, disulfide bond formation, demethylation, formation of covalent cross-links, formation of cysteine, formation of pyroglutamate, formylation, gamma-carboxylation, glycosylation, GPI anchor formation, hydroxylation, iodination, methylation, myristoylation, oxidation, pegylation, proteolytic processing, phosphorylation, prenylation, racemization, selenoylation, sulfation, transfer-RNA mediated addition of amino acids to proteins such as arginylation, and ubiquitination. (See, for instance, PROTEINS - STRUCTURE AND MOLECULAR PROPERTIES, 2nd Ed., T. E. Creighton, W. H. Freeman and Company, New York (1993); POSTTRANSLATIONAL COVALENT MODIFICATION OF PROTEINS, B. C. Johnson, Ed., Academic Press, New York, pgs. 1-12 (1983); Seifter et al., Meth. Enzymol. 182:626-646 (1990); Rattan et al., Ann. N.Y. Acad. Sci. 663:48-62 (1992)).

[0180] Also provided by the invention are chemically modified derivatives of the polypeptides of the invention which may provide additional advantages such as increased solubility, stability and circulating time of the polypeptide, or decreased immunogenicity (see U.S. Patent No. 4,179,337). The chemical moieties for derivitization may be selected from water soluble polymers such as polyethylene glycol, ethylene glycol/propylene glycol copolymers, carboxymethylcellulose, dextran, polyvinyl alcohol and the like. The

polypeptides may be modified at random positions within the molecule, or at predetermined positions within the molecule and may include one, two, three or more attached chemical moieties.

[0181] The polymer may be of any molecular weight, and may be branched or unbranched. For polyethylene glycol, the preferred molecular weight is between about 1 kDa and about 100 kDa (the term "about" indicating that in preparations of polyethylene glycol, some molecules will weigh more, some less, than the stated molecular weight) for ease in handling and manufacturing. Other sizes may be used, depending on the desired therapeutic profile (e.g., the duration of sustained release desired, the effects, if any on biological activity, the ease in handling, the degree or lack of antigenicity and other known effects of the polyethylene glycol to a therapeutic protein or analog). For example, the polyethylene glycol may have an average molecular weight of about 200, 500, 1000, 1500, 2000, 2500, 3000, 3500, 4000, 4500, 5000, 5500, 6000, 6500, 7000, 7500, 8000, 8500, 9000, 9500, 10,000, 10,500, 11,000, 11,500, 12,000, 12,500, 13,000, 13,500, 14,000, 14,500, 15,000, 15,500, 16,000, 16,500, 17,000, 17,500, 18,000, 18,500, 19,000, 19,500, 20,000, 25,000, 30,000, 35,000, 40,000, 45,000, 50,000, 55,000, 60,000, 65,000, 70,000, 75,000, 80,000, 85,000, 90,000, 95,000, or 100,000 kDa.

[0182] As noted above, the polyethylene glycol may have a branched structure. Branched polyethylene glycols are described, for example, in U.S. Patent No. 5,643,575; Morpurgo *et al., Appl. Biochem. Biotechnol. 56*:59-72 (1996); Vorobjev *et al., Nucleosides Nucleotides 18*:2745-2750 (1999); and Caliceti *et al., Bioconjug. Chem. 10*:638-646 (1999), the disclosures of each of which are incorporated herein by reference.

[0183] The polyethylene glycol molecules (or other chemical moieties) should be attached to the protein with consideration of effects on functional or antigenic domains of the protein. There are a number of attachment methods available to those skilled in the art, such as, for example, the method disclosed in EP 0 401 384 (coupling PEG to G-CSF), herein incorporated by reference; see also Malik et al., Exp. Hematol. 20:1028-1035 (1992), reporting pegylation of GM-CSF using tresyl chloride. For example, polyethylene glycol may be covalently bound through amino acid residues via a reactive group, such as a free amino or carboxyl group. Reactive groups are those to which an activated polyethylene glycol molecule may be bound. The amino acid residues having a free amino group may include lysine residues and the N-terminal amino acid residues; those having a free carboxyl

group may include aspartic acid residues glutamic acid residues and the C-terminal amino acid residue. Sulfhydryl groups may also be used as a reactive group for attaching the polyethylene glycol molecules. Preferred for therapeutic purposes is attachment at an amino group, such as attachment at the N-terminus or lysine group.

[0184] As suggested above, polyethylene glycol may be attached to proteins via linkage to any of a number of amino acid residues. For example, polyethylene glycol can be linked to proteins via covalent bonds to lysine, histidine, aspartic acid, glutamic acid, or cysteine residues. One or more reaction chemistries may be employed to attach polyethylene glycol to specific amino acid residues (e.g., lysine, histidine, aspartic acid, glutamic acid, or cysteine) of the protein or to more than one type of amino acid residue (e.g., lysine, histidine, aspartic acid, glutamic acid, cysteine and combinations thereof) of the protein.

[0185] One may specifically desire proteins chemically modified at the N-terminus. Using polyethylene glycol as an illustration of the present composition, one may select from a variety of polyethylene glycol molecules (by molecular weight, branching, etc.), the proportion of polyethylene glycol molecules to protein (polypeptide) molecules in the reaction mix, the type of pegylation reaction to be performed, and the method of obtaining the selected N-terminally pegylated protein. The method of obtaining the N-terminally pegylated preparation (i.e., separating this moiety from other monopegylated moieties if necessary) may be by purification of the N-terminally pegylated material from a population of pegylated protein molecules. Selective proteins chemically modified at the N-terminus modification may be accomplished by reductive alkylation which exploits differential reactivity of different types of primary amino groups (lysine versus the N-terminal) available for derivatization in a particular protein. Under the appropriate reaction conditions, substantially selective derivatization of the protein at the N-terminus with a carbonyl group containing polymer is achieved.

[0186] As indicated above, pegylation of the proteins of the invention may be accomplished by any number of means. For example, polyethylene glycol may be attached to the protein either directly or by an intervening linker. Linkerless systems for attaching polyethylene glycol to proteins are described in Delgado et al., Crit. Rev. Thera. Drug Carrier Sys. 9:249-304 (1992); Francis et al., Intern. J. of Hematol. 68:1-18 (1998); U.S. Patent No. 4,002,531; U.S. Patent No. 5,349,052; WO 95/06058; and WO 98/32466, the disclosures of each of which are incorporated herein by reference.

[0187] One system for attaching polyethylene glycol directly to amino acid residues of proteins without an intervening linker employs tresylated MPEG, which is produced by the modification of monmethoxy polyethylene glycol (MPEG) using tresylchloride ($ClSO_2CH_2CF_3$). Upon reaction of protein with tresylated MPEG, polyethylene glycol is directly attached to amine groups of the protein. Thus, the invention includes protein-polyethylene glycol conjugates produced by reacting proteins of the invention with a polyethylene glycol molecule having a 2,2,2-trifluoreothane sulphonyl group.

[0188] Polyethylene glycol can also be attached to proteins using a number of different intervening linkers. For example, U.S. Patent No. 5,612,460, the entire disclosure of which is incorporated herein by reference, discloses urethane linkers for connecting polyethylene glycol to proteins. Protein-polyethylene glycol conjugates wherein the polyethylene glycol is attached to the protein by a linker can also be produced by reaction of proteins with compounds such as MPEG-succinimidylsuccinate, MPEG activated with 1,1'-carbonyldiimidazole, MPEG-2,4,5-trichloropenylcarbonate, MPEG-p-nitrophenolcarbonate, and various MPEG-succinate derivatives. A number of additional polyethylene glycol derivatives and reaction chemistries for attaching polyethylene glycol to proteins are described in International Publication No. WO 98/32466, the entire disclosure of which is incorporated herein by reference. Pegylated protein products produced using the reaction chemistries set out herein are included within the scope of the invention.

[0189] The number of polyethylene glycol moieties attached to each protein of the invention (i.e., the degree of substitution) may also vary. For example, the pegylated proteins of the invention may be linked, on average, to 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 15, 17, 20, or more polyethylene glycol molecules. Similarly, the average degree of substitution within ranges such as 1-3, 2-4, 3-5, 4-6, 5-7, 6-8, 7-9, 8-10, 9-11, 10-12, 11-13, 12-14, 13-15, 14-16, 15-17, 16-18, 17-19, or 18-20 polyethylene glycol moieties per protein molecule. Methods for determining the degree of substitution are discussed, for example, in Delgado et al., Crit. Rev. Thera. Drug Carrier Sys. 9:249-304 (1992).

[0190] The polypeptides of the invention can be recovered and purified from chemical synthesis and recombinant cell cultures by standard methods which include, but are not limited to, ammonium sulfate or ethanol precipitation, acid extraction, anion or cation exchange chromatography, phosphocellulose chromatography, hydrophobic interaction chromatography, affinity chromatography, hydroxylapatite chromatography and lectin

chromatography. Most preferably, high performance liquid chromatography ("HPLC") is employed for purification. Well known techniques for refolding protein may be employed to regenerate active conformation when the polypeptide is denatured during isolation and/or purification.

[0191] The polypeptides of the invention may be in monomers or multimers (i.e., dimers, trimers, tetramers and higher multimers). Accordingly, the present invention relates to monomers and multimers of the polypeptides of the invention, their preparation, and compositions (preferably, Therapeutics) containing them. In specific embodiments, the polypeptides of the invention are monomers, dimers, trimers or tetramers. In additional embodiments, the multimers of the invention are at least dimers, at least trimers, or at least tetramers.

[0192] Multimers encompassed by the invention may be homomers or heteromers. As used herein, the term homomer refers to a multimer containing only polypeptides corresponding to a protein of the invention (e.g., the amino acid sequence of SEQ ID NO:Y, an amino acid sequence encoded by SEQ ID NO:X or the complement of SEQ ID NO:X, the amino acid sequence encoded by the portion of SEQ ID NO:X as defined in columns 8 and 9 of Table 2, and/or an amino acid sequence encoded by cDNA contained in Clone ID NO:Z (including fragments, variants, splice variants, and fusion proteins, corresponding to these as described herein)). These homomers may contain polypeptides having identical or different amino acid sequences. In a specific embodiment, a homomer of the invention is a multimer containing only polypeptides having an identical amino acid sequence. In another specific embodiment, a homomer of the invention is a multimer containing polypeptides having different amino acid sequences. In specific embodiments, the multimer of the invention is a homodimer (e.g., containing two polypeptides having identical or different amino acid sequences) or a homotrimer (e.g., containing three polypeptides having identical and/or different amino acid sequences). In additional embodiments, the homomeric multimer of the invention is at least a homodimer, at least a homotrimer, or at least a homotetramer.

[0193] As used herein, the term heteromer refers to a multimer containing one or more heterologous polypeptides (i.e., polypeptides of different proteins) in addition to the polypeptides of the invention. In a specific embodiment, the multimer of the invention is a heterodimer, a heterotrimer, or a heterotetramer. In additional embodiments, the heteromeric

multimer of the invention is at least a heterodimer, at least a heterotrimer, or at least a heterotetramer.

[0194] Multimers of the invention may be the result of hydrophobic, hydrophilic, ionic and/or covalent associations and/or may be indirectly linked by, for example, liposome formation. Thus, in one embodiment, multimers of the invention, such as, for example, homodimers or homotrimers, are formed when polypeptides of the invention contact one another in solution. In another embodiment, heteromultimers of the invention, such as, for example, heterotrimers or heterotetramers, are formed when polypeptides of the invention contact antibodies to the polypeptides of the invention (including antibodies to the heterologous polypeptide sequence in a fusion protein of the invention) in solution. In other embodiments, multimers of the invention are formed by covalent associations with and/or between the polypeptides of the invention. Such covalent associations may involve one or more amino acid residues contained in the polypeptide sequence (e.g., that recited in SEQ ID NO:Y, encoded by the portion of SEQ ID NO:X as defined in columns 8 and 9 of Table 2, and/or encoded by the cDNA contained in Clone ID NO:Z). In one instance, the covalent associations are cross-linking between cysteine residues located within the polypeptide sequences which interact in the native (i.e., naturally occurring) polypeptide. In another instance, the covalent associations are the consequence of chemical or recombinant manipulation. Alternatively, such covalent associations may involve one or more amino acid residues contained in the heterologous polypeptide sequence in a fusion protein. In one example, covalent associations are between the heterologous sequence contained in a fusion protein of the invention (see, e.g., US Patent Number 5,478,925). In a specific example, the covalent associations are between the heterologous sequence contained in a Fc fusion protein of the invention (as described herein). In another specific example, covalent associations of fusion proteins of the invention are between heterologous polypeptide sequence from another protein that is capable of forming covalently associated multimers, such as for example, osteoprotegerin (see, e.g., International Publication NO: WO 98/49305, the contents of which are herein incorporated by reference in its entirety). In another embodiment, two or more polypeptides of the invention are joined through peptide linkers. Examples include those peptide linkers described in U.S. Pat. No. 5,073,627 (hereby incorporated by reference). Proteins comprising multiple polypeptides of the invention separated by peptide linkers may be produced using conventional recombinant DNA technology.

[0195] Another method for preparing multimer polypeptides of the invention involves use of polypeptides of the invention fused to a leucine zipper or isoleucine zipper polypeptide sequence. Leucine zipper and isoleucine zipper domains are polypeptides that promote multimerization of the proteins in which they are found. Leucine zippers were originally identified in several DNA-binding proteins (Landschulz et al., Science 240:1759, (1988)), and have since been found in a variety of different proteins. Among the known leucine zippers are naturally occurring peptides and derivatives thereof that dimerize or trimerize. Examples of leucine zipper domains suitable for producing soluble multimeric proteins of the invention are those described in PCT application WO 94/10308, hereby incorporated by reference. Recombinant fusion proteins comprising a polypeptide of the invention fused to a polypeptide sequence that dimerizes or trimerizes in solution are expressed in suitable host cells, and the resulting soluble multimeric fusion protein is recovered from the culture supernatant using techniques known in the art.

[0196] Trimeric polypeptides of the invention may offer the advantage of enhanced biological activity. Preferred leucine zipper moieties and isoleucine moieties are those that preferentially form trimers. One example is a leucine zipper derived from lung surfactant protein D (SPD), as described in Hoppe et al. (FEBS Letters 344:191, (1994)) and in U.S. patent application Ser. No. 08/446,922, hereby incorporated by reference. Other peptides derived from naturally occurring trimeric proteins may be employed in preparing trimeric polypeptides of the invention.

[0197] In another example, proteins of the invention are associated by interactions between Flag® polypeptide sequence contained in fusion proteins of the invention containing Flag® polypeptide sequence. In a further embodiment, proteins of the invention are associated by interactions between heterologous polypeptide sequence contained in Flag® fusion proteins of the invention and anti-Flag® antibody.

[0198] The multimers of the invention may be generated using chemical techniques known in the art. For example, polypeptides desired to be contained in the multimers of the invention may be chemically cross-linked using linker molecules and linker molecule length optimization techniques known in the art (see, e.g., US Patent Number 5,478,925, which is herein incorporated by reference in its entirety). Additionally, multimers of the invention may be generated using techniques known in the art to form one or more inter-molecule cross-links between the cysteine residues located within the sequence of the polypeptides

desired to be contained in the multimer (see, e.g., US Patent Number 5,478,925, which is herein incorporated by reference in its entirety). Further, polypeptides of the invention may be routinely modified by the addition of cysteine or biotin to the C-terminus or N-terminus of the polypeptide and techniques known in the art may be applied to generate multimers containing one or more of these modified polypeptides (see, e.g., US Patent Number 5,478,925, which is herein incorporated by reference in its entirety). Additionally, techniques known in the art may be applied to generate liposomes containing the polypeptide components desired to be contained in the multimer of the invention (see, e.g., US Patent Number 5,478,925, which is herein incorporated by reference in its entirety).

[0199] Alternatively, multimers of the invention may be generated using genetic engineering techniques known in the art. In one embodiment, polypeptides contained in multimers of the invention are produced recombinantly using fusion protein technology described herein or otherwise known in the art (see, e.g., US Patent Number 5,478,925, which is herein incorporated by reference in its entirety). In a specific embodiment, polynucleotides coding for a homodimer of the invention are generated by ligating a polynucleotide sequence encoding a polypeptide of the invention to a sequence encoding a linker polypeptide and then further to a synthetic polynucleotide encoding the translated product of the polypeptide in the reverse orientation from the original C-terminus to the N-terminus (lacking the leader sequence) (see, e.g., US Patent Number 5,478,925, which is herein incorporated by reference in its entirety). In another embodiment, recombinant techniques described herein or otherwise known in the art are applied to generate recombinant polypeptides of the invention which contain a transmembrane domain (or hydrophobic or signal peptide) and which can be incorporated by membrane reconstitution techniques into liposomes (see, e.g., US Patent Number 5,478,925, which is herein incorporated by reference in its entirety).

Antibodies

[0200] Further polypeptides of the invention relate to antibodies and T-cell antigen receptors (TCR) which immunospecifically bind a polypeptide, polypeptide fragment, or variant of the invention (e.g., a polypeptide or fragment or variant of the amino acid sequence of SEQ ID NO:Y or a polypeptide encoded by the cDNA contained in Clone ID No:Z, and/or an epitope, of the present invention) as determined by immunoassays well known in the art

for assaying specific antibody-antigen binding. Antibodies of the invention include, but are not limited to, polyclonal, monoclonal, multispecific, human, humanized or chimeric antibodies, single chain antibodies, Fab fragments, F(ab') fragments, fragments produced by a Fab expression library, anti-idiotypic (anti-Id) antibodies (including, e.g., anti-Id antibodies to antibodies of the invention), intracellularly-made antibodies (i.e., intrabodies), and epitope-binding fragments of any of the above. The term "antibody," as used herein, refers to immunoglobulin molecules and immunologically active portions of immunoglobulin molecules, i.e., molecules that contain an antigen binding site that immunospecifically binds an antigen. The immunoglobulin molecules of the invention can be of any type (e.g., IgG, IgE, IgM, IgD, IgA and IgY), class (e.g., IgG1, IgG2, IgG3, IgG4, IgA1 and IgA2) or subclass of immunoglobulin molecule. In preferred embodiments, the immunoglobulin molecules of the invention are IgG1. In other preferred embodiments, the immunoglobulin molecules of the invention are IgG4.

[0201] Most preferably the antibodies are human antigen-binding antibody fragments of the present invention and include, but are not limited to, Fab, Fab' and F(ab')2, Fd, single-chain Fvs (scFv), single-chain antibodies, disulfide-linked Fvs (sdFv) and fragments comprising either a VL or VH domain. Antigen-binding antibody fragments, including single-chain antibodies, may comprise the variable region(s) alone or in combination with the entirety or a portion of the following: hinge region, CH1, CH2, and CH3 domains. Also included in the invention are antigen-binding fragments also comprising any combination of variable region(s) with a hinge region, CH1, CH2, and CH3 domains. The antibodies of the invention may be from any animal origin including birds and mammals. Preferably, the antibodies are human, murine (e.g., mouse and rat), donkey, ship rabbit, goat, guinea pig, camel, horse, or chicken. As used herein, "human" antibodies include antibodies having the amino acid sequence of a human immunoglobulin and include antibodies isolated from human immunoglobulin libraries or from animals transgenic for one or more human immunoglobulin and that do not express endogenous immunoglobulins, as described infra and, for example in, U.S. Patent No. 5,939,598 by Kucherlapati et al.

[0202] The antibodies of the present invention may be monospecific, bispecific, trispecific or of greater multispecificity. Multispecific antibodies may be specific for different epitopes of a polypeptide of the present invention or may be specific for both a polypeptide of the present invention as well as for a heterologous epitope, such as a heterologous polypeptide or

solid support material. See, e.g., PCT publications WO 93/17715; WO 92/08802; WO 91/00360; WO 92/05793; Tutt, et al., J. Immunol. 147:60-69 (1991); U.S. Patent Nos. 4,474,893; 4,714,681; 4,925,648; 5,573,920; 5,601,819; Kostelny et al., J. Immunol. 148:1547-1553 (1992).

[0203] Antibodies of the present invention may be described or specified in terms of the epitope(s) or portion(s) of a polypeptide of the present invention which they recognize or specifically bind. The epitope(s) or polypeptide portion(s) may be specified as described herein, e.g., by N-terminal and C-terminal positions, or by size in contiguous amino acid residues, or listed in the Tables and Figures. Preferred epitopes of the invention include the predicted epitopes shown in column 7 of Table 1, as well as polynucleotides that encode these epitopes. Antibodies which specifically bind any epitope or polypeptide of the present invention may also be excluded. Therefore, the present invention includes antibodies that specifically bind polypeptides of the present invention, and allows for the exclusion of the same.

[0204] Antibodies of the present invention may also be described or specified in terms of their cross-reactivity. Antibodies that do not bind any other analog, ortholog, or homolog of a polypeptide of the present invention are included. Antibodies that bind polypeptides with at least 95%, at least 90%, at least 85%, at least 80%, at least 75%, at least 70%, at least 65%, at least 60%, at least 55%, and at least 50% identity (as calculated using methods known in the art and described herein) to a polypeptide of the present invention are also included in the present invention. In specific embodiments, antibodies of the present invention cross-react with murine, rat and/or rabbit homologs of human proteins and the corresponding epitopes thereof. Antibodies that do not bind polypeptides with less than 95%, less than 90%, less than 85%, less than 80%, less than 75%, less than 70%, less than 65%, less than 60%, less than 55%, and less than 50% identity (as calculated using methods known in the art and described herein) to a polypeptide of the present invention are also included in the present invention. In a specific embodiment, the above-described cross-reactivity is with respect to any single specific antigenic or immunogenic polypeptide, or combination(s) of 2, 3, 4, 5, or more of the specific antigenic and/or immunogenic polypeptides disclosed herein. Further included in the present invention are antibodies which bind polypeptides encoded by polynucleotides which hybridize to a polynucleotide of the present invention under stringent hybridization conditions (as described herein). Antibodies of the present invention may also be described

or specified in terms of their binding affinity to a polypeptide of the invention. Preferred binding affinities include those with a dissociation constant or Kd less than 5×10^{-2} M, 10^{-2} M, 5×10^{-3} M, 10^{-3} M, 5×10^{-4} M, 10^{-4} M, 5×10^{-5} M, 10^{-5} M, 5×10^{-6} M, 10^{-6}M, 5×10^{-7} M, 10^{7} M, 5×10^{-8} M, 10^{-8} M, 5×10^{-9} M, 10^{-9} M, 5×10^{-10} M, 10^{-10} M, 5×10^{-11} M, 10^{-11} M, 5×10^{-12} M, 10^{-12} M, 5×10^{-13} M, 10^{-13} M, 5×10^{-14} M, 10^{-14} M, 5×10^{-15} M, or 10^{-15} M.

[0205] The invention also provides antibodies that competitively inhibit binding of an antibody to an epitope of the invention as determined by any method known in the art for determining competitive binding, for example, the immunoassays described herein. In preferred embodiments, the antibody competitively inhibits binding to the epitope by at least 95%, at least 90%, at least 85 %, at least 80%, at least 75%, at least 70%, at least 60%, or at least 50%.

[0206] Antibodies of the present invention may act as agonists or antagonists of the polypeptides of the present invention. For example, the present invention includes antibodies which disrupt the receptor/ligand interactions with the polypeptides of the invention either partially or fully. Preferably, antibodies of the present invention bind an antigenic epitope disclosed herein, or a portion thereof. The invention features both receptor-specific antibodies and ligand-specific antibodies. The invention also features receptor-specific antibodies which do not prevent ligand binding but prevent receptor activation. Receptor activation (i.e., signaling) may be determined by techniques described herein or otherwise known in the art. For example, receptor activation can be determined by detecting the phosphorylation (e.g., tyrosine or serine/threonine) of the receptor or its substrate by immunoprecipitation followed by western blot analysis (for example, as described *supra*). In specific embodiments, antibodies are provided that inhibit ligand activity or receptor activity by at least 95%, at least 90%, at least 85%, at least 80%, at least 75%, at least 70%, at least 60%, or at least 50% of the activity in absence of the antibody.

[0207] The invention also features receptor-specific antibodies which both prevent ligand binding and receptor activation as well as antibodies that recognize the receptor-ligand complex, and, preferably, do not specifically recognize the unbound receptor or the unbound ligand. Likewise, included in the invention are neutralizing antibodies which bind the ligand and prevent binding of the ligand to the receptor, as well as antibodies which bind the ligand, thereby preventing receptor activation, but do not prevent the ligand from binding the receptor. Further included in the invention are antibodies which activate the receptor. These

antibodies may act as receptor agonists, i.e., potentiate or activate either all or a subset of the biological activities of the ligand-mediated receptor activation, for example, by inducing dimerization of the receptor. The antibodies may be specified as agonists, antagonists or inverse agonists for biological activities comprising the specific biological activities of the peptides of the invention disclosed herein. The above antibody agonists can be made using methods known in the art. See, e.g., PCT publication WO 96/40281; U.S. Patent No. 5,811,097; Deng et al., Blood 92(6):1981-1988 (1998); Chen et al., Cancer Res. 58(16):3668-3678 (1998); Harrop et al., J. Immunol. 161(4):1786-1794 (1998); Zhu et al., Cancer Res. 58(15):3209-3214 (1998); Yoon et al., J. Immunol. 160(7):3170-3179 (1998); Prat et al., J. Cell. Sci. 111(Pt2):237-247 (1998); Pitard et al., J. Immunol. Methods 205(2):177-190 (1997); Liautard et al., Cytokine 9(4):233-241 (1997); Carlson et al., J. Biol. Chem. 272(17):11295-11301 (1997); Taryman et al., Neuron 14(4):755-762 (1995); Muller et al., Structure 6(9):1153-1167 (1998); Bartunek et al., Cytokine 8(1):14-20 (1996) (which are all incorporated by reference herein in their entireties).

[0208] Antibodies of the present invention may be used, for example, to purify, detect, and target the polypeptides of the present invention, including both *in vitro* and *in vivo* diagnostic and therapeutic methods. For example, the antibodies have utility in immunoassays for qualitatively and quantitatively measuring levels of the polypeptides of the present invention in biological samples. See, e.g., Harlow et al., Antibodies: A Laboratory Manual, (Cold Spring Harbor Laboratory Press, 2nd ed. 1988); incorporated by reference herein in its entirety.

[0209] As discussed in more detail below, the antibodies of the present invention may be used either alone or in combination with other compositions. The antibodies may further be recombinantly fused to a heterologous polypeptide at the N- or C-terminus or chemically conjugated (including covalent and non-covalent conjugations) to polypeptides or other compositions. For example, antibodies of the present invention may be recombinantly fused or conjugated to molecules useful as labels in detection assays and effector molecules such as heterologous polypeptides, drugs, radionuclides, or toxins. See, e.g., PCT publications WO 92/08495; WO 91/14438; WO 89/12624; U.S. Patent No. 5,314,995; and EP 396,387; the disclosures of which are incorporated herein by reference in their entireties.

[0210] The antibodies of the invention include derivatives that are modified, i.e, by the covalent attachment of any type of molecule to the antibody such that covalent attachment

does not prevent the antibody from generating an anti-idiotypic response. For example, but not by way of limitation, the antibody derivatives include antibodies that have been modified, e.g., by glycosylation, acetylation, pegylation, phosphylation, amidation, derivatization by known protecting/blocking groups, proteolytic cleavage, linkage to a cellular ligand or other protein, etc. Any of numerous chemical modifications may be carried out by known techniques, including, but not limited to specific chemical cleavage, acetylation, formylation, metabolic synthesis of tunicamycin, etc. Additionally, the derivative may contain one or more non-classical amino acids.

[0211] The antibodies of the present invention may be generated by any suitable method known in the art. Polyclonal antibodies to an antigen-of- interest can be produced by various procedures well known in the art. For example, a polypeptide of the invention can be administered to various host animals including, but not limited to, rabbits, mice, rats, etc. to induce the production of sera containing polyclonal antibodies specific for the antigen. Various adjuvants may be used to increase the immunological response, depending on the host species, and include but are not limited to, Freund's (complete and incomplete), mineral gels such as aluminum hydroxide, surface active substances such as lysolecithin, pluronic polyols, polyanions, peptides, oil emulsions, keyhole limpet hemocyanins, dinitrophenol, and potentially useful human adjuvants such as BCG (bacille Calmette-Guerin) and corynebacterium parvum. Such adjuvants are also well known in the art.

[0212] Monoclonal antibodies can be prepared using a wide variety of techniques known in the art including the use of hybridoma, recombinant, and phage display technologies, or a combination thereof. For example, monoclonal antibodies can be produced using hybridoma techniques including those known in the art and taught, for example, in Harlow et al., Antibodies: A Laboratory Manual, (Cold Spring Harbor Laboratory Press, 2nd ed. 1988); Hammerling, et al., in: Monoclonal Antibodies and T-Cell Hybridomas 563-681 (Elsevier, N.Y., 1981) (said references incorporated by reference in their entireties). The term "monoclonal antibody" as used herein is not limited to antibodies produced through hybridoma technology. The term "monoclonal antibody" refers to an antibody that is derived from a single clone, including any eukaryotic, prokaryotic, or phage clone, and not the method by which it is produced.

[0213] Methods for producing and screening for specific antibodies using hybridoma technology are routine and well known in the art and are discussed in detail in the Examples.

In a non-limiting example, mice can be immunized with a polypeptide of the invention or a cell expressing such peptide. Once an immune response is detected, e.g., antibodies specific for the antigen are detected in the mouse serum, the mouse spleen is harvested and splenocytes isolated. The splenocytes are then fused by well known techniques to any suitable myeloma cells, for example cells from cell line SP20 available from the ATCC. Hybridomas are selected and cloned by limited dilution. The hybridoma clones are then assayed by methods known in the art for cells that secrete antibodies capable of binding a polypeptide of the invention. Ascites fluid, which generally contains high levels of antibodies, can be generated by immunizing mice with positive hybridoma clones.

[0214] Accordingly, the present invention provides methods of generating monoclonal antibodies as well as antibodies produced by the method comprising culturing a hybridoma cell secreting an antibody of the invention wherein, preferably, the hybridoma is generated by fusing splenocytes isolated from a mouse immunized with an antigen of the invention with myeloma cells and then screening the hybridomas resulting from the fusion for hybridoma clones that secrete an antibody able to bind a polypeptide of the invention.

[0215] Another well known method for producing both polyclonal and monoclonal human B cell lines is transformation using Epstein Barr Virus (EBV). Protocols for generating EBV-transformed B cell lines are commonly known in the art, such as, for example, the protocol outlined in Chapter 7.22 of Current Protocols in Immunology, Coligan et al., Eds., 1994, John Wiley & Sons, NY, which is hereby incorporated in its entirety by reference. The source of B cells for transformation is commonly human peripheral blood, but B cells for transformation may also be derived from other sources including, but not limited to, lymph nodes, tonsil, spleen, tumor tissue, and infected tissues. Tissues are generally made into single cell suspensions prior to EBV transformation. Additionally, steps may be taken to either physically remove or inactivate T cells (e.g., by treatment with cyclosporin A) in B cell-containing samples, because T cells from individuals seropositive for anti-EBV antibodies can suppress B cell immortalization by EBV.

[0216] In general, the sample containing human B cells is innoculated with EBV, and cultured for 3-4 weeks. A typical source of EBV is the culture supernatant of the B95-8 cell line (ATCC #VR-1492). Physical signs of EBV transformation can generally be seen towards the end of the 3-4 week culture period. By phase-contrast microscopy, transformed cells may appear large, clear, hairy and tend to aggregate in tight clusters of cells. Initially,

EBV lines are generally polyclonal. However, over prolonged periods of cell cultures, EBV lines may become monoclonal or polyclonal as a result of the selective outgrowth of particular B cell clones. Alternatively, polyclonal EBV transformed lines may be subcloned (e.g., by limiting dilution culture) or fused with a suitable fusion partner and plated at limiting dilution to obtain monoclonal B cell lines. Suitable fusion partners for EBV transformed cell lines include mouse myeloma cell lines (e.g., SP2/0, X63-Ag8.653), heteromyeloma cell lines (human x mouse; e.g, SPAM-8, SBC-H20, and CB-F7), and human cell lines (e.g., GM 1500, SKO-007, RPMI 8226, and KR-4). Thus, the present invention also provides a method of generating polyclonal or monoclonal human antibodies against polypeptides of the invention or fragments thereof, comprising EBV-transformation of human B cells.

[0217] Antibody fragments which recognize specific epitopes may be generated by known techniques. For example, Fab and F(ab')2 fragments of the invention may be produced by proteolytic cleavage of immunoglobulin molecules, using enzymes such as papain (to produce Fab fragments) or pepsin (to produce F(ab')2 fragments). F(ab')2 fragments contain the variable region, the light chain constant region and the CH1 domain of the heavy chain.

[0218] For example, the antibodies of the present invention can also be generated using various phage display methods known in the art. In phage display methods, functional antibody domains are displayed on the surface of phage particles which carry the polynucleotide sequences encoding them. In a particular embodiment, such phage can be utilized to display antigen binding domains expressed from a repertoire or combinatorial antibody library (e.g., human or murine). Phage expressing an antigen binding domain that binds the antigen of interest can be selected or identified with antigen, e.g., using labeled antigen or antigen bound or captured to a solid surface or bead. Phage used in these methods are typically filamentous phage including fd and M13 binding domains expressed from phage with Fab, Fv or disulfide stabilized Fv antibody domains recombinantly fused to either the phage gene III or gene VIII protein. Examples of phage display methods that can be used to make the antibodies of the present invention include those disclosed in Brinkman et al., J. Immunol. Methods 182:41-50 (1995); Ames et al., J. Immunol. Methods 184:177-186 (1995); Kettleborough et al., Eur. J. Immunol. 24:952-958 (1994); Persic et al., Gene 187 9-18 (1997); Burton et al., Advances in Immunology 57:191-280 (1994); PCT application No. PCT/GB91/01134; PCT publications WO 90/02809; WO 91/10737; WO 92/01047; WO

92/18619; WO 93/11236; WO 95/15982; WO 95/20401; and U.S. Patent Nos. 5,698,426; 5,223,409; 5,403,484; 5,580,717; 5,427,908; 5,750,753; 5,821,047; 5,571,698; 5,427,908; 5,516,637; 5,780,225; 5,658,727; 5,733,743 and 5,969,108; each of which is incorporated herein by reference in its entirety.

[0219] As described in the above references, after phage selection, the antibody coding regions from the phage can be isolated and used to generate whole antibodies, including human antibodies, or any other desired antigen binding fragment, and expressed in any desired host, including mammalian cells, insect cells, plant cells, yeast, and bacteria, e.g., as described in detail below. For example, techniques to recombinantly produce Fab, Fab' and F(ab')2 fragments can also be employed using methods known in the art such as those disclosed in PCT publication WO 92/22324; Mullinax et al., BioTechniques 12(6):864-869 (1992); and Sawai et al., AJRI 34:26-34 (1995); and Better et al., Science 240:1041-1043 (1988) (said references incorporated by reference in their entireties).

[0220] Examples of techniques which can be used to produce single-chain Fvs and antibodies include those described in U.S. Patents 4,946,778 and 5,258,498; Huston et al., Methods in Enzymology 203:46-88 (1991); Shu et al., PNAS 90:7995-7999 (1993); and Skerra et al., Science 240:1038-1040 (1988). For some uses, including *in vivo* use of antibodies in humans and in vitro detection assays, it may be preferable to use chimeric, humanized, or human antibodies. A chimeric antibody is a molecule in which different portions of the antibody are derived from different animal species, such as antibodies having a variable region derived from a murine monoclonal antibody and a human immunoglobulin constant region. Methods for producing chimeric antibodies are known in the art. See e.g., Morrison, Science 229:1202 (1985); Oi et al., BioTechniques 4:214 (1986); Gillies et al., (1989) J. Immunol. Methods 125:191-202; U.S. Patent Nos. 5,807,715; 4,816,567; and 4,816397, which are incorporated herein by reference in their entirety. Humanized antibodies are antibody molecules from non-human species antibody that binds the desired antigen having one or more complementarity determining regions (CDRs) from the non-human species and a framework regions from a human immunoglobulin molecule. Often, framework residues in the human framework regions will be substituted with the corresponding residue from the CDR donor antibody to alter, preferably improve, antigen binding. These framework substitutions are identified by methods well known in the art, e.g., by modeling of the interactions of the CDR and framework residues to identify framework

residues important for antigen binding and sequence comparison to identify unusual framework residues at particular positions. (See, e.g., Queen et al., U.S. Patent No. 5,585,089; Riechmann et al., Nature 332:323 (1988), which are incorporated herein by reference in their entireties.) Antibodies can be humanized using a variety of techniques known in the art including, for example, CDR-grafting (EP 239,400; PCT publication WO 91/09967; U.S. Patent Nos. 5,225,539; 5,530,101; and 5,585,089), veneering or resurfacing (EP 592,106; EP 519,596; Padlan, Molecular Immunology 28(4/5):489-498 (1991); Studnicka et al., Protein Engineering 7(6):805-814 (1994); Roguska. et al., PNAS 91:969-973 (1994)), and chain shuffling (U.S. Patent No. 5,565,332).

[0221] Completely human antibodies are particularly desirable for therapeutic treatment of human patients. Human antibodies can be made by a variety of methods known in the art including phage display methods described above using antibody libraries derived from human immunoglobulin sequences. See also, U.S. Patent Nos. 4,444,887 and 4,716,111; and PCT publications WO 98/46645, WO 98/50433, WO 98/24893, WO 98/16654, WO 96/34096, WO 96/33735, and WO 91/10741; each of which is incorporated herein by reference in its entirety.

[0222] Human antibodies can also be produced using transgenic mice which are incapable of expressing functional endogenous immunoglobulins, but which can express human immunoglobulin genes. For example, the human heavy and light chain immunoglobulin gene complexes may be introduced randomly or by homologous recombination into mouse embryonic stem cells. Alternatively, the human variable region, constant region, and diversity region may be introduced into mouse embryonic stem cells in addition to the human heavy and light chain genes. The mouse heavy and light chain immunoglobulin genes may be rendered non-functional separately or simultaneously with the introduction of human immunoglobulin loci by homologous recombination. In particular, homozygous deletion of the JH region prevents endogenous antibody production. The modified embryonic stem cells are expanded and microinjected into blastocysts to produce chimeric mice. The chimeric mice are then bred to produce homozygous offspring which express human antibodies. The transgenic mice are immunized in the normal fashion with a selected antigen, e.g., all or a portion of a polypeptide of the invention. Monoclonal antibodies directed against the antigen can be obtained from the immunized, transgenic mice using conventional hybridoma technology. The human immunoglobulin transgenes harbored by the transgenic mice

rearrange during B cell differentiation, and subsequently undergo class switching and somatic mutation. Thus, using such a technique, it is possible to produce therapeutically useful IgG, IgA, IgM and IgE antibodies. For an overview of this technology for producing human antibodies, see Lonberg and Huszar, Int. Rev. Immunol. 13:65-93 (1995). For a detailed discussion of this technology for producing human antibodies and human monoclonal antibodies and protocols for producing such antibodies, see, e.g., PCT publications WO 98/24893; WO 92/01047; WO 96/34096; WO 96/33735; European Patent No. 0 598 877; U.S. Patent Nos. 5,413,923; 5,625,126; 5,633,425; 5,569,825; 5,661,016; 5,545,806; 5,814,318; 5,885,793; 5,916,771; 5,939,598; 6,075,181; and 6,114,598, which are incorporated by reference herein in their entirety. In addition, companies such as Abgenix, Inc. (Freemont, CA) and Genpharm (San Jose, CA) can be engaged to provide human antibodies directed against a selected antigen using technology similar to that described above.

[0223] Completely human antibodies which recognize a selected epitope can be generated using a technique referred to as "guided selection." In this approach a selected non-human monoclonal antibody, e.g., a mouse antibody, is used to guide the selection of a completely human antibody recognizing the same epitope. (Jespers et al., Bio/technology 12:899-903 (1988)).

[0224] Further, antibodies to the polypeptides of the invention can, in turn, be utilized to generate anti-idiotype antibodies that "mimic" polypeptides of the invention using techniques well known to those skilled in the art. (See, e.g., Greenspan & Bona, FASEB J. 7(5):437-444; (1989) and Nissinoff, J. Immunol. 147(8):2429-2438 (1991)). For example, antibodies which bind to and competitively inhibit polypeptide multimerization and/or binding of a polypeptide of the invention to a ligand can be used to generate anti-idiotypes that "mimic" the polypeptide multimerization and/or binding domain and, as a consequence, bind to and neutralize polypeptide and/or its ligand. Such neutralizing anti-idiotypes or Fab fragments of such anti-idiotypes can be used in therapeutic regimens to neutralize polypeptide ligand(s)/receptor(s). For example, such anti-idiotypic antibodies can be used to bind a polypeptide of the invention and/or to bind its ligand(s)/receptor(s), and thereby block its biological activity. Alternatively, antibodies which bind to and enhance polypeptide multimerization and/or binding, and/or receptor/ligand multimerization, binding and/or signaling can be used to generate anti-idiotypes that function as agonists of a polypeptide of

the invention and/or its ligand/receptor. Such agonistic anti-idiotypes or Fab fragments of such anti-idiotypes can be used in therapeutic regimens as agonists of the polypeptides of the invention or its ligand(s)/receptor(s). For example, such anti-idiotypic antibodies can be used to bind a polypeptide of the invention and/or to bind its ligand(s)/receptor(s), and thereby promote or enhance its biological activity.

[0225] Intrabodies of the invention can be produced using methods known in the art, such as those disclosed and reviewed in Chen et al., Hum. Gene Ther. 5:595-601 (1994); Marasco, W.A., Gene Ther. 4:11-15 (1997); Rondon and Marasco, Annu. Rev. Microbiol. 51:257-283 (1997); Proba et al., J. Mol. Biol. 275:245-253 (1998); Cohen et al., Oncogene 17:2445-2456 (1998); Ohage and Steipe, J. Mol. Biol. 291:1119-1128 (1999); Ohage et al., J. Mol. Biol. 291:1129-1134 (1999); Wirtz and Steipe, Protein Sci. 8:2245-2250 (1999); Zhu et al., J. Immunol. Methods 231:207-222 (1999); and references cited therein.

Polynucleotides Encoding Antibodies

[0226] The invention further provides polynucleotides comprising a nucleotide sequence encoding an antibody of the invention and fragments thereof. The invention also encompasses polynucleotides that hybridize under stringent or alternatively, under lower stringency hybridization conditions, e.g., as defined *supra*, to polynucleotides that encode an antibody, preferably, that specifically binds to a polypeptide of the invention, preferably, an antibody that binds to a polypeptide having the amino acid sequence of SEQ ID NO:Y, to a polypeptide encoded by a portion of SEQ ID NO:X as defined in columns 8 and 9 of Table 2, and/or to a polypeptide encoded by the cDNA contained in Clone ID NO:Z.

[0227] The polynucleotides may be obtained, and the nucleotide sequence of the polynucleotides determined, by any method known in the art. For example, if the nucleotide sequence of the antibody is known, a polynucleotide encoding the antibody may be assembled from chemically synthesized oligonucleotides (e.g., as described in Kutmeier et al., BioTechniques 17:242 (1994)), which, briefly, involves the synthesis of overlapping oligonucleotides containing portions of the sequence encoding the antibody, annealing and ligating of those oligonucleotides, and then amplification of the ligated oligonucleotides by PCR.

[0228] Alternatively, a polynucleotide encoding an antibody may be generated from nucleic acid from a suitable source. If a clone containing a nucleic acid encoding a particular

antibody is not available, but the sequence of the antibody molecule is known, a nucleic acid encoding the immunoglobulin may be chemically synthesized or obtained from a suitable source (e.g., an antibody cDNA library, or a cDNA library generated from, or nucleic acid, preferably poly A+ RNA, isolated from, any tissue or cells expressing the antibody, such as hybridoma cells selected to express an antibody of the invention) by PCR amplification using synthetic primers hybridizable to the 3' and 5' ends of the sequence or by cloning using an oligonucleotide probe specific for the particular gene sequence to identify, e.g., a cDNA clone from a cDNA library that encodes the antibody. Amplified nucleic acids generated by PCR may then be cloned into replicable cloning vectors using any method well known in the art.

[0229] Once the nucleotide sequence and corresponding amino acid sequence of the antibody is determined, the nucleotide sequence of the antibody may be manipulated using methods well known in the art for the manipulation of nucleotide sequences, e.g., recombinant DNA techniques, site directed mutagenesis, PCR, etc. (see, for example, the techniques described in Sambrook et al., 1990, Molecular Cloning, A Laboratory Manual, 2d Ed., Cold Spring Harbor Laboratory, Cold Spring Harbor, NY and Ausubel et al., eds., 1998, Current Protocols in Molecular Biology, John Wiley & Sons, NY, which are both incorporated by reference herein in their entireties), to generate antibodies having a different amino acid sequence, for example to create amino acid substitutions, deletions, and/or insertions.

[0230] In a specific embodiment, the amino acid sequence of the heavy and/or light chain variable domains may be inspected to identify the sequences of the complementarity determining regions (CDRs) by methods that are well know in the art, e.g., by comparison to known amino acid sequences of other heavy and light chain variable regions to determine the regions of sequence hypervariability. Using routine recombinant DNA techniques, one or more of the CDRs may be inserted within framework regions, e.g., into human framework regions to humanize a non-human antibody, as described *supra*. The framework regions may be naturally occurring or consensus framework regions, and preferably human framework regions (see, e.g., Chothia et al., J. Mol. Biol. 278: 457-479 (1998) for a listing of human framework regions). Preferably, the polynucleotide generated by the combination of the framework regions and CDRs encodes an antibody that specifically binds a polypeptide of the invention. Preferably, as discussed *supra*, one or more amino acid substitutions may be

made within the framework regions, and, preferably, the amino acid substitutions improve binding of the antibody to its antigen. Additionally, such methods may be used to make amino acid substitutions or deletions of one or more variable region cysteine residues participating in an intrachain disulfide bond to generate antibody molecules lacking one or more intrachain disulfide bonds. Other alterations to the polynucleotide are encompassed by the present invention and within the skill of the art.

[0231] In addition, techniques developed for the production of "chimeric antibodies" (Morrison et al., Proc. Natl. Acad. Sci. 81:851-855 (1984); Neuberger et al., Nature 312:604-608 (1984); Takeda et al., Nature 314:452-454 (1985)) by splicing genes from a mouse antibody molecule of appropriate antigen specificity together with genes from a human antibody molecule of appropriate biological activity can be used. As described *supra*, a chimeric antibody is a molecule in which different portions are derived from different animal species, such as those having a variable region derived from a murine mAb and a human immunoglobulin constant region, e.g., humanized antibodies.

[0232] Alternatively, techniques described for the production of single chain antibodies (U.S. Patent No. 4,946,778; Bird, Science 242:423- 42 (1988); Huston et al., Proc. Natl. Acad. Sci. USA 85:5879-5883 (1988); and Ward et al., Nature 334:544-54 (1989)) can be adapted to produce single chain antibodies. Single chain antibodies are formed by linking the heavy and light chain fragments of the Fv region via an amino acid bridge, resulting in a single chain polypeptide. Techniques for the assembly of functional Fv fragments in E. coli may also be used (Skerra et al., Science 242:1038- 1041 (1988)).

Methods of Producing Antibodies

[0233] The antibodies of the invention can be produced by any method known in the art for the synthesis of antibodies, in particular, by chemical synthesis or preferably, by recombinant expression techniques. Methods of producing antibodies include, but are not limited to, hybridoma technology, EBV transformation, and other methods discussed herein as well as through the use recombinant DNA technology, as discussed below.

[0234] Recombinant expression of an antibody of the invention, or fragment, derivative or analog thereof, (e.g., a heavy or light chain of an antibody of the invention or a single chain antibody of the invention), requires construction of an expression vector containing a polynucleotide that encodes the antibody. Once a polynucleotide encoding an antibody

molecule or a heavy or light chain of an antibody, or portion thereof (preferably containing the heavy or light chain variable domain), of the invention has been obtained, the vector for the production of the antibody molecule may be produced by recombinant DNA technology using techniques well known in the art. Thus, methods for preparing a protein by expressing a polynucleotide containing an antibody encoding nucleotide sequence are described herein. Methods which are well known to those skilled in the art can be used to construct expression vectors containing antibody coding sequences and appropriate transcriptional and translational control signals. These methods include, for example, in vitro recombinant DNA techniques, synthetic techniques, and *in vivo* genetic recombination. The invention, thus, provides replicable vectors comprising a nucleotide sequence encoding an antibody molecule of the invention, or a heavy or light chain thereof, or a heavy or light chain variable domain, operably linked to a promoter. Such vectors may include the nucleotide sequence encoding the constant region of the antibody molecule (see, e.g., PCT Publication WO 86/05807; PCT Publication WO 89/01036; and U.S. Patent No. 5,122,464) and the variable domain of the antibody may be cloned into such a vector for expression of the entire heavy or light chain.

[0235] The expression vector is transferred to a host cell by conventional techniques and the transfected cells are then cultured by conventional techniques to produce an antibody of the invention. Thus, the invention includes host cells containing a polynucleotide encoding an antibody of the invention, or a heavy or light chain thereof, or a single chain antibody of the invention, operably linked to a heterologous promoter. In preferred embodiments for the expression of double-chained antibodies, vectors encoding both the heavy and light chains may be co-expressed in the host cell for expression of the entire immunoglobulin molecule, as detailed below.

[0236] A variety of host-expression vector systems may be utilized to express the antibody molecules of the invention. Such host-expression systems represent vehicles by which the coding sequences of interest may be produced and subsequently purified, but also represent cells which may, when transformed or transfected with the appropriate nucleotide coding sequences, express an antibody molecule of the invention in situ. These include but are not limited to microorganisms such as bacteria (e.g., E. coli, B. subtilis) transformed with recombinant bacteriophage DNA, plasmid DNA or cosmid DNA expression vectors containing antibody coding sequences; yeast (e.g., Saccharomyces, Pichia) transformed with recombinant yeast expression vectors containing antibody coding sequences; insect cell

systems infected with recombinant virus expression vectors (e.g., baculovirus) containing antibody coding sequences; plant cell systems infected with recombinant virus expression vectors (e.g., cauliflower mosaic virus, CaMV; tobacco mosaic virus, TMV) or transformed with recombinant plasmid expression vectors (e.g., Ti plasmid) containing antibody coding sequences; or mammalian cell systems (e.g., COS, CHO, BHK, 293, 3T3 cells) harboring recombinant expression constructs containing promoters derived from the genome of mammalian cells (e.g., metallothionein promoter) or from mammalian viruses (e.g., the adenovirus late promoter; the vaccinia virus 7.5K promoter). Preferably, bacterial cells such as Escherichia coli, and more preferably, eukaryotic cells, especially for the expression of whole recombinant antibody molecule, are used for the expression of a recombinant antibody molecule. For example, mammalian cells such as Chinese hamster ovary cells (CHO), in conjunction with a vector such as the major intermediate early gene promoter element from human cytomegalovirus is an effective expression system for antibodies (Foecking et al., Gene 45:101 (1986); Cockett et al., Bio/Technology 8:2 (1990)).

[0237] In bacterial systems, a number of expression vectors may be advantageously selected depending upon the use intended for the antibody molecule being expressed. For example, when a large quantity of such a protein is to be produced, for the generation of pharmaceutical compositions of an antibody molecule, vectors which direct the expression of high levels of fusion protein products that are readily purified may be desirable. Such vectors include, but are not limited, to the E. coli expression vector pUR278 (Ruther et al., EMBO J. 2:1791 (1983)), in which the antibody coding sequence may be ligated individually into the vector in frame with the lac Z coding region so that a fusion protein is produced; pIN vectors (Inouye & Inouye, Nucleic Acids Res. 13:3101-3109 (1985); Van Heeke & Schuster, J. Biol. Chem. 24:5503-5509 (1989)); and the like. pGEX vectors may also be used to express foreign polypeptides as fusion proteins with glutathione S-transferase (GST). In general, such fusion proteins are soluble and can easily be purified from lysed cells by adsorption and binding to matrix glutathione-agarose beads followed by elution in the presence of free glutathione. The pGEX vectors are designed to include thrombin or factor Xa protease cleavage sites so that the cloned target gene product can be released from the GST moiety.

[0238] In an insect system, Autographa californica nuclear polyhedrosis virus (AcNPV) is used as a vector to express foreign genes. The virus grows in *Spodoptera frugiperda* cells.